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ISSUE!

50 CENTS OCTOBER 1961

MOVIE SECTION

8 & 16MM MOVIE PROJECTORS: THE INSIDE STORY OF HOW & WHY THEY WORK ▷ HOW KODACHROME II WILL EXTEND AVAILABLE LIGHT 8MM WORK ▷ 3 WAYS TO GET MORE FROM YOUR ZOOM LENS ▷ IS 8MM SOUND READY FOR YOU? BIG EXTRA: ARE ALL THE ELECTRONIC FLASH GUIDE NUMBERS REAL NONSENSE?

2 1/4 SECTION

GET WITH IT! TRY GADGETS FOR CRAZY 2 1/4 COLOR ▷ SHOOT 35MM WITH A 2 1/4 ▷ TRY THE UNIQUE TECHNIQUES OF TETER KEETMAN ▷ GET THE BEST 2 1/4 SLIDE PROJECTOR ▷ BIND YOUR SLIDES THE BEST WAY ▷ READ ABOUT EXCITING FUTURE OF 2 1/4

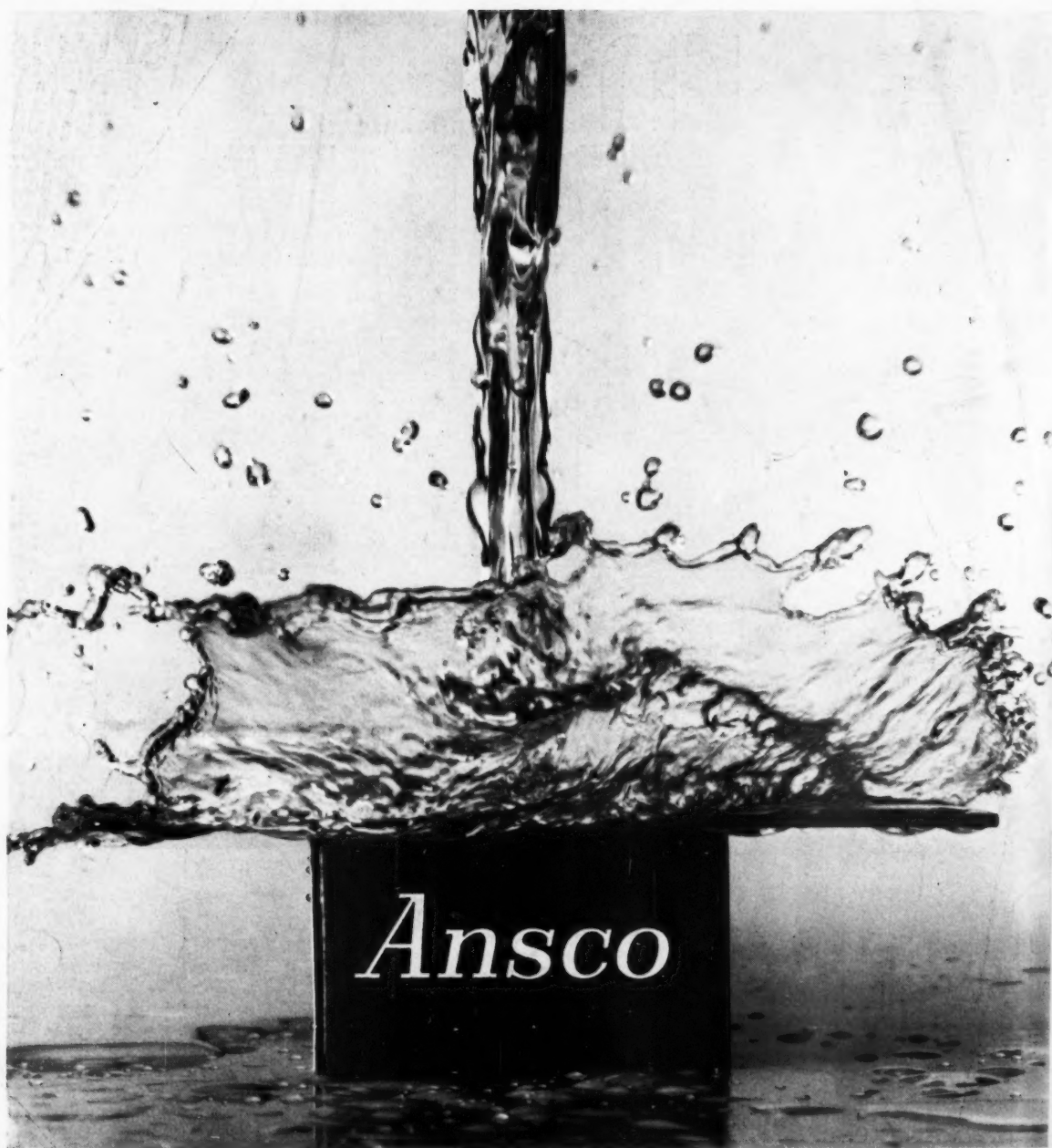


PHOTO BY IRVING PENN ON ANSCO SUPER HYPAN® FILM

high speed: *(in black and white film)* 1. the ability to record a good image under poor lighting conditions and a sharp image under normal lighting conditions, 2. the opening of a new world of available light so that everything the eye can see—the camera can capture, 3. the allowing of a faster shutter speed so that high speed action can be recorded without blur, 4. the permitting of a smaller lens opening, greater leeway for focusing, a better opportunity to achieve clear, sharp pictures... *(as in Ansco Super Hypan).*



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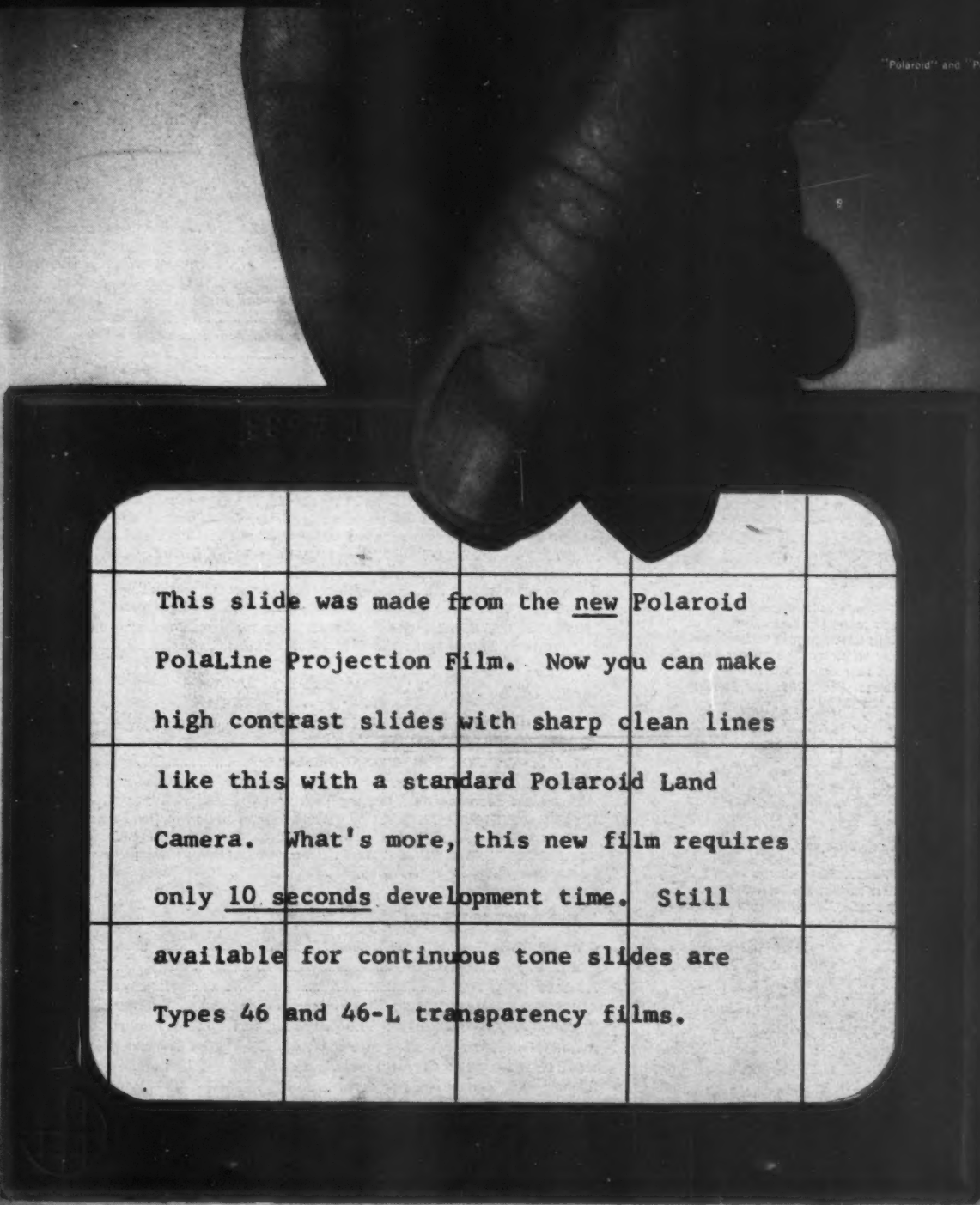


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only 10 seconds development time. Still
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Types 46 and 46-L transparency films.

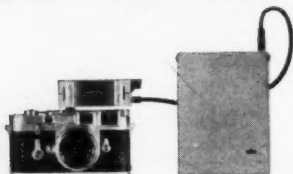
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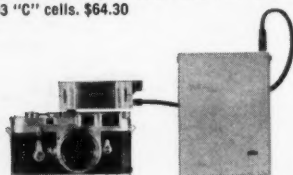
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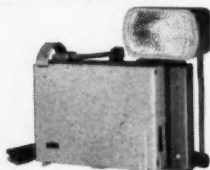
MORE POWER ...PER OUNCEPER INCH BRAUN HOBBY ELECTRONIC FLASH UNITS famous monitor circuit keeps batteries charged longer



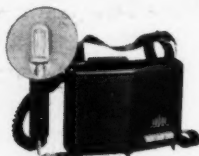
POCKET-PAK F-30 with Kodachrome II Guide: 51. Wide-angle head so tiny you hardly know it's on the camera. Hip-pocket size pack with power of bulkier, costlier units. Exclusive monitor keeps output at maximum; drains batteries only as capacitor recharges itself. With four Eveready E93 "C" cells. \$64.30



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modern PHOTOGRAPHY

OCTOBER 1961, VOL. 25, NO. 10

EVERETT GELLERT, Publisher

AUGUSTUS WOLFMAN, Ed.-in-Chief

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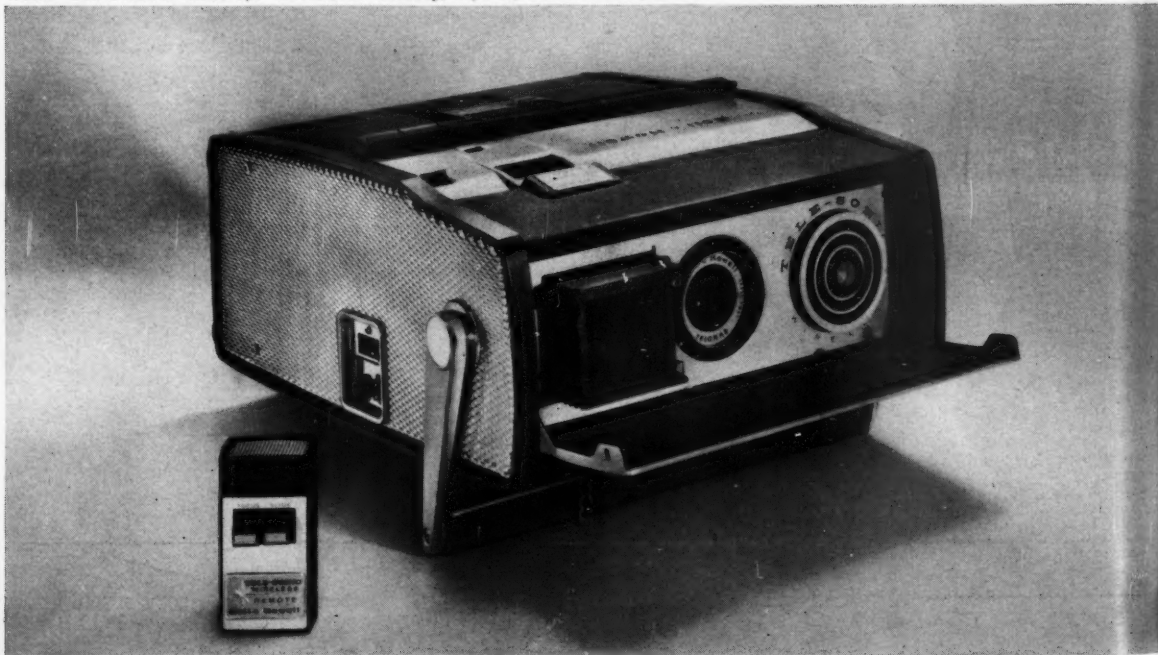
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Here are the three most advanced photo products in the world. They are so perfectly engineered and assembled with such precision and craftsmanship that they carry the unique Bell & Howell Certificate of Excellence. The Certificate covers not only basic materials and workmanship, but *all* costs for time and labor required to remedy *any defect* incurred at *any time* and in *any way* for a full 5 years from the date of purchase. Only batteries and film, not under Bell & Howell control, are not covered by the guarantee. The feature innovations and ease of use designed into each product are startling. See and try all three at your Bell & Howell dealer.

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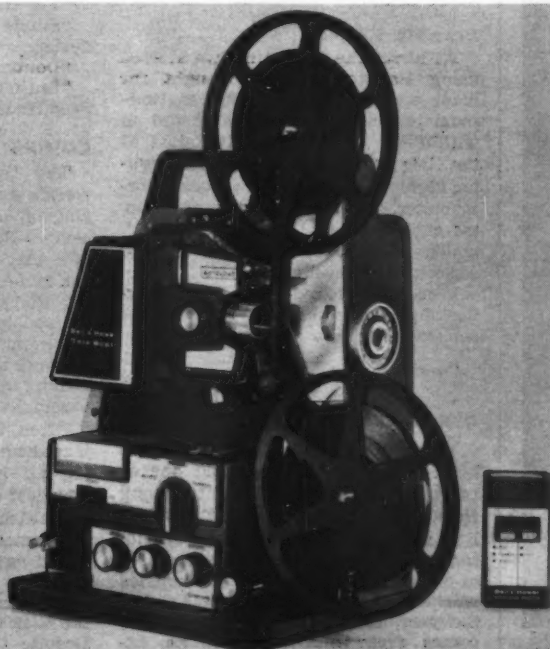
Explorer Tele-Sonic Slide Projector — You get the freedom of wireless control with Bell & Howell's ultra-sonic remote control unit. From as far away from the projector as 40 feet, you

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Reflex Zoomatic with OPTRONIC EYE—the only 8mm camera with a reflex sensing system that makes f/stop changes even while you zoom. No other 8mm camera combines so many features into one unit: reflex eye, reflex viewing, ground glass

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Dual/Lectric Tele-Sonic 8mm Projector — the only wireless remote control 8mm. projector you can buy. Automatic threading, forward and reverse control, automatic room light switch,

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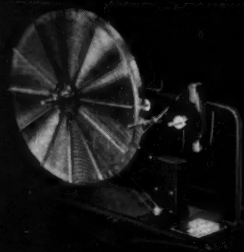
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Coffee Break WITH THE EDITORS

THIS MONTH'S COVER . . .

The two silhouetted cameras, movie and 2 1/4, stand back-to-back like duelists. That's the way art director Ernest Scarfone planned 'em and Conrad Studios photographed 'em. We think the two sections make a nicely contrasted issue, but cameras will be cameras, so let them shoot it out.

IT CAN HAPPEN . . .

. . . to the best of us! This exchange of letters between MODERN's executive editor and Mr. G. H. Murray of Sheldon, Iowa, needs no further comment:

Dear Mr. Murray:

We have consulted with our film technician, John Wolbarst, and both of us are completely unable to understand why you should not be getting excellent results with DK-50 and D-76.

May we suggest that you carefully test your thermometer, which could possibly be at fault. We do not know of any other developer we could recommend that we would consider to give measurably superior results to those obtained by DK-50 and D-76. Frankly, it seems rather odd to us.

Sincerely yours,
Herbert Keppler

Dear Mr. Keppler:

At about the same time we started using Panatomic-X, we bought for black-and-white processing a thermometer claimed to be accurate to within 1/8° and negligently failed at the time to check it against our regular highly accurate color process thermometer. Following your suggestion, we checked it and found it off 7 1/2°, which fact undoubtedly led us into serious over-development. . . .

We are a little red-faced at overlooking something so basic as thermometer accuracy. Thanks again for the tip.

Sincerely,
G. H. Murray

OUR OWN U.N.? . . .

We've become fairly accustomed to hearing French, English and one or two other mildly exotic accents among fellow staff members here at MODERN. But we think it's worthy of special note that we now have a representative of one of the world's newest countries working for us. Ralph Modupe Ayodele Sawyerr, to give him his full name, comes from Sierra Leone, an ex-British colony on the West African coast that became an independent nation on April 27 this year. Ralph, who works part-time for MODERN, is

in New York to study industrial administration. He has traveled pretty widely in Europe, and he plans to return to Sierra Leone when his studies



EDWARD MEYERS

From Africa to Modern's roof.

are completed. In the picture above he's wearing a ceremonial costume that was designed to celebrate Sierra Leone's independence.

OBVIOUSLY! . . .

Movie editor Mike Matzkin reports that a friend of his went into a camera store to buy some color movie film.

"I'd like some 8mm Kodachrome," "Single or double-8?" asked the dealer.

"Double-8."

"In that case," said the dealer, "you need Kodachrome II."

COMING ATTRACTIONS . . .

The trailer that announces next week's movie is the Cinderella of the cinema, one that usually doesn't deserve a Prince Charming. Back in the 30's the "Coming attractions" rarely ran to more than a series of stills showing the stars in close-up with some mildly informative lettering. Then more and more trailers began to move: we were shown actual scenes from the coming movie, usually the cream of its passion, violence or spectacle.

Often these moving trailers were jazzed up with optical effects, including all kinds of wipes (one scene "pushes" another off the screen, sometimes straight across from side to side, sometimes swinging across like a windshield wiper, sometimes expanding from the middle in a circular shape, sometimes appearing to flip over from the back of the preceding scene, etc.). Despite these tricks, all the trailers we could remember seeing have looked depressingly alike—until recently, when our neighborhood theater

(Continued on page 10)



The man with a Nikon F is master of all he surveys

There isn't a picture problem he can't tackle; there isn't an assignment he can't handle. He need only reach out to draw upon an almost inexhaustible store of accessories. There are more than twenty interchangeable Nikkor lenses for the Nikon F, including a special micro lens, three automatic zooms and two catadioptric systems. There are two electric motor drives; a radio control; intervalometer; repeating flash; exposure meter; waist level finder, interchangeable focusing screens, microscope adapters, filters, hoods and macro-copy equipment.

The man with a Nikon F is master of all he surveys. He commands a system of photography whose scope and versatility are virtually unlimited. See it at your franchise Nikon dealer. For complete details write Dept.MP10.

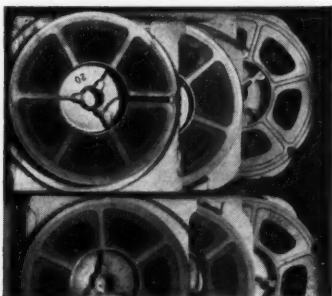


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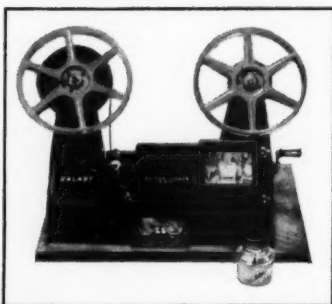


Water skiing on Lake George, New York.

Have A Nice Summer?



Take Lots of Movies?



What You Need Is A **KALART**

Model EV-8 • only \$29.95

Your vacation movies are priceless. But think of how much more fun they can be when you don't have to change reels every few minutes . . . or make explanations for out-of-order scenes . . . or apologize for poorly exposed footage. The Kalart Editor-Viewer 8 has everything you need for improving 8mm movies. Its built-in viewer shows pictures with unsurpassed brightness, sharpness and steadiness. Single handle control provides for smooth action and rapid rewind. Efficient cooling prevents film from overheating. 400-foot reel capacity. Splicer is designed with exclusive "Dual-Purpose" feature to permit use of film cement or splicing tapes. Ask your photo dealer for a demonstration. It's your first step toward more movie enjoyment.

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Packed with tips on editing
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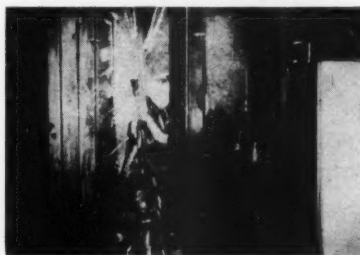
(Continued from page 8)

screened the trailer of *Mad Dog Coll* (shorter versions also appeared on TV). This was made up almost entirely of stills; but they were nothing like the formal, posed stills of the early trailers. Here, frames had been taken from the movie itself, and most of them showed a blur of action (see the examples below). These unusual stills were edited together in a quick-cut rhythm that matched the sound track, a blaring jazz accompaniment. Altogether it was an exciting piece of screen work.

As a technical note, since there were no paper prints of the scenes in the



Coming: whiz (above) bang (below)!



trailer (they had been printed optically straight from the movie), we had to take a somewhat devious route in order to show you the cuts. Columbia Pictures sent us a 16mm positive print of the trailer that had been used for TV showing; from that we snipped out the scenes we wanted and sent them to Compo Photo Service, who blew the frames up to 5 x 7 internegatives and then made contact prints.

EXPERT'S CHOICE • • •

When our printers warned us that the engraving of Norman Rothschild's portrait at the head of his "Modern Color" column was wearing out, we asked Norman to supply us with a recent picture of himself for a new engraving. A few days later he strolled into our office and dropped a couple of photos on the desk. In the words of "Modern Tests," they were "acceptably sharp and well-exposed," but suspiciously familiar in size and shape.

"Where did you have these taken, Norman?" we asked.

"In one of those automatic booths in the subway," he replied. And then, seeing our shocked faces, he added: "I'm a great believer in automation."

The automated picture of our automationist is on page 28.—THE END

TWO IMPORTANT NEW ADVANCES IN TWIN-LENS REFLEX PHOTOGRAPHY

Twin-lens photography 'came of age' with the introduction of the Mamiya C2. Its exclusive lens interchangeability feature established it as the world's most versatile twin-lens reflex.

Now, with the availability of the new interchangeable wide angle lens and the new Porroflex image-erecting eyelevel finder, the Mamiya C2 is even more versatile than ever before. There is hardly a picture situation which this camera can't tackle.

NEW 65mm f3.5 WIDE ANGLE LENS Like lens interchangeability itself, twin-lens, wide-angle photography is now another Mamiya C2 exclusive. With Mamiya C2 you can interchange lenses at any time—from normal 80mm lens to 105, to 135 or 180mm telephoto or to the new 65mm wide angle lens—even in the middle of a roll, and get the field coverage that's "just right" for the picture. The new Mamiya 65mm wide angle lens is mounted in an M-X synchro-flash shutter, with speeds from 1 second to 1/500th plus 'B'. Its angle of view is 68 degrees. Price is \$149.50.

NEW PORROFLEX IMAGE-ERECTING EYELEVEL FINDER

The Porroflex is an ingenious mirror system that interchanges almost instantly with the standard waist-level hood, and permits you to focus and view at eyelevel whenever you choose. The image is bright, erect—right-side-up—and unreversed. Focusing is fast—positive—and the entire field is seen at a glance—even with glasses. The new Porroflex is much more manageable and more convenient to use than a prism finder. It weighs less, is less bulky and less costly. Price is only \$29.95.

P. S.—There is also a Porroflex finder (Model R) for Rolleiflex cameras with removable hoods—same price.

Initial supplies of these exciting new C2 accessories will be limited. Be sure to reserve yours early at your Mamiya dealer. For literature and the name of your nearest dealer, write Dept. MP-10

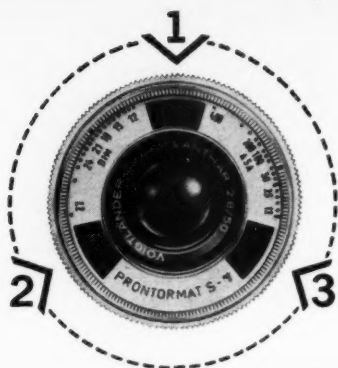
MAMIYA • A Division of Caprod Ltd., 111 Fifth Ave., N. Y. 3
In Canada: Precision Cameras of Canada, Ltd., 5385 Parc St., Montreal 9, P. Q.

NEW EYELEVEL FINDER



NEW WIDE ANGLE LENS

FOR THE MAMIYA C2



3 lens-centered light cells—
full picture area accuracy

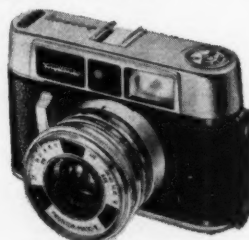


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LETTERS TO THE EDITOR

How Near Is Near?

I feel that I must add a warning to the article *How Near for Action* in your June 1961 issue. There is no doubt that the sense of really "being" close is admirable, but I would advise photographer Ernst Haas and others to be sure their accident insurance is fully valid before trying it. While photographing a rodeo (really close) in Montana, I encountered a bronco that apparently harbored a dislike for photographers. My wife took a snapshot of me



MRS. C. ATKINSON

Put out of action by action.

a couple of days later and, although my Graphic was repaired, it will never again be the same. I now take full advantage of telephoto lens.

San Francisco, Calif. C. J. Atkinson

Extension Granted

In your August 1961 issue, page 59, figure 1, the explanation below the chart is incorrect.

Philadelphia, Pa.

Leo D. Jones

Reader Jones refers to the method for measuring lens extension. The author also noticed it and herewith sets the matter straight. Says Hermann Eisenbeiss: "Extension here is not equal to lens-to-film distance (which would be very difficult to measure) but is merely the length of the extension tubes or bellows used. Since the zero point of the scale is marked infinity the misinterpretation is obvious."—ED.

(Continued on page 14)

MODERN PHOTOGRAPHY

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GRAPHY



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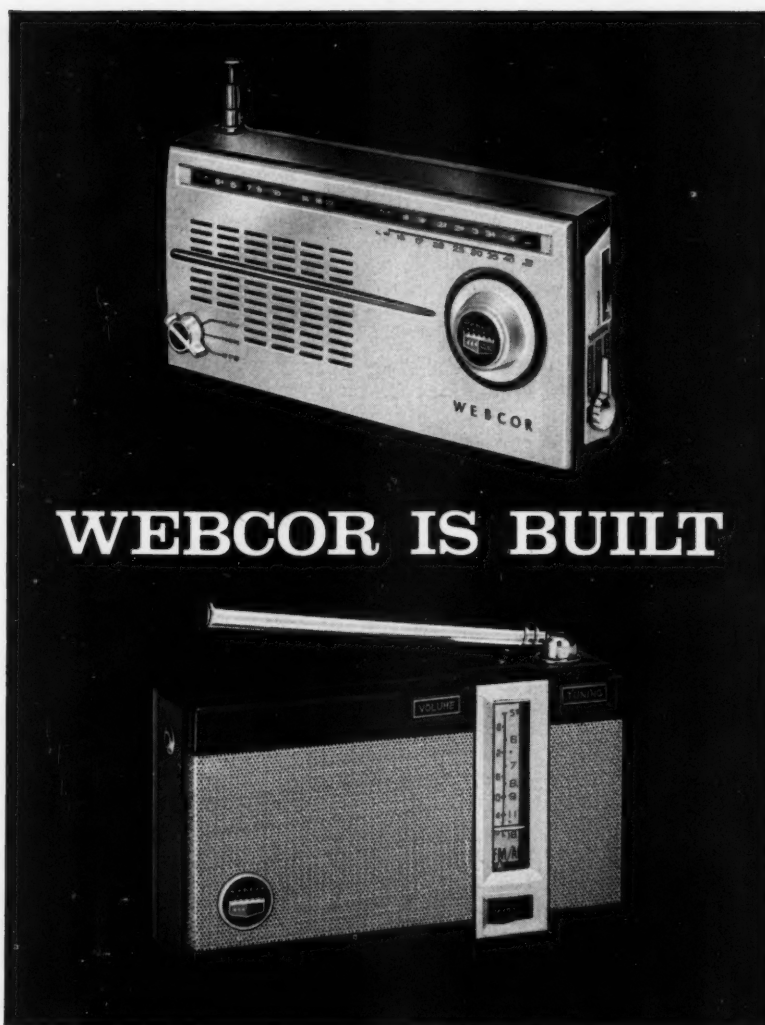
One camera—a Hasselblad 500C—is all you need ever carry. It sets up in seconds for everything from micro to telephoto work. The secret? The system—the Hasselblad system of interchangeable lenses (covering 9° to 90°), film backs and accessories. And the case carries all.

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chronized for flash and strobe at all speeds (1 sec. to 1/500). Each with automatic depth-of-field indicators. Cross coupling and EVS system too. Switch viewfinders and film backs. (Change from b-and-w to color in mid roll.) And switch as you like between negative sizes and a host of other accessories. Isn't it time you started building your studio in a travel case? Write Dept. HMP-10 for the name of the nearest

dealer. Paillard Inc., 100 Sixth Avenue, New York. Hasselblad 500C with 80mm lens \$549.50. Accessories shown include: 60mm, 150mm (on camera), 250mm Zeiss lenses; Super-Wide C Camera, extra backs, bellows extension, magnifying hood, sports finders, micro-adaptor, extension tubes, rapid crank, filters and new Pentaprism.

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WEBCOR, INC., Chicago: tape recorders, portable and console fonographs, radios, components

LETTERS

(Continued from page 12)

Keep Them Afloat

For a year I have been married to a photographer, despite prior warnings from my mother and then prospective mother-in-law. I am now the subject of test shots only.

Among his attempts to interest me in photography has been the appeal to domestic instincts. He brought home a copy of your July issue and gleefully read me the section of "Coffee Break" having to do with berries that sink when some wetting agent is dumped in the water. First of all, what housewife wants a bunch of sunken berries? Secondly, what housewife has a handy pint of strawberries, etc., around just to humor a photographer-type husband? But being in a humorous mood, I granted him a few radishes for the cause. Despite three capfuls of Kodak Photo-Flo, the radishes floated! I grant that a radish isn't a berry, but still. . . Urbana, Ill. Amy H. Lindley

IN NEXT MONTH'S MODERN

The chaos in AG-1 bulbs and
what to do about it.

Inasmuch as our labels for Kodak Photo-Flo solution specifically state that Kodak Photo-Flo can be harmful if swallowed and should not be taken internally, we think we should call this matter to your attention, and suggest that you might like to also pass this information along to Mr. Plaut. I might also note that the labels do state that if Kodak Photo-Flo solution is swallowed, vomiting should be induced and medical attention should be obtained at once.

Rochester 4, N.Y. Robert W. Brown
Eastman Kodak Co.

Photographer Fred Plaut, the original berry sinker, used Photo-Flo only in the first water, to get the berries wet and under water where they would stay until ready for individual cleaning. He certainly does not recommend any further use of this water, and suggests rinsing the berries thoroughly several times afterward.—ED.

Autographic, Anyone?

I would like to find a plate back for a 3-A Autographic Kodak, Model C, and some holders and a ground glass. All I have now is the roll film back. The camera is in perfect condition and I have three lenses for it.

Bellaire, Ohio C. Lee Eddy



NOW... a focusing reflex zoom-8 camera with automatic diaphragm, electric motor drive, multiple speeds, fades, lap dissolves, remote control, and every necessary feature for professional-type home movies... under \$130

New Yashica U-Matic offers you through-the-lens ground-glass focusing and viewing—no parallax, no framing errors at any distance. f1.8 lens zooms from 9 to 28mm, and can be used at any intermediate focal length for wide angle, normal or telephoto scenes. Lens focuses from 3 feet to infinity.

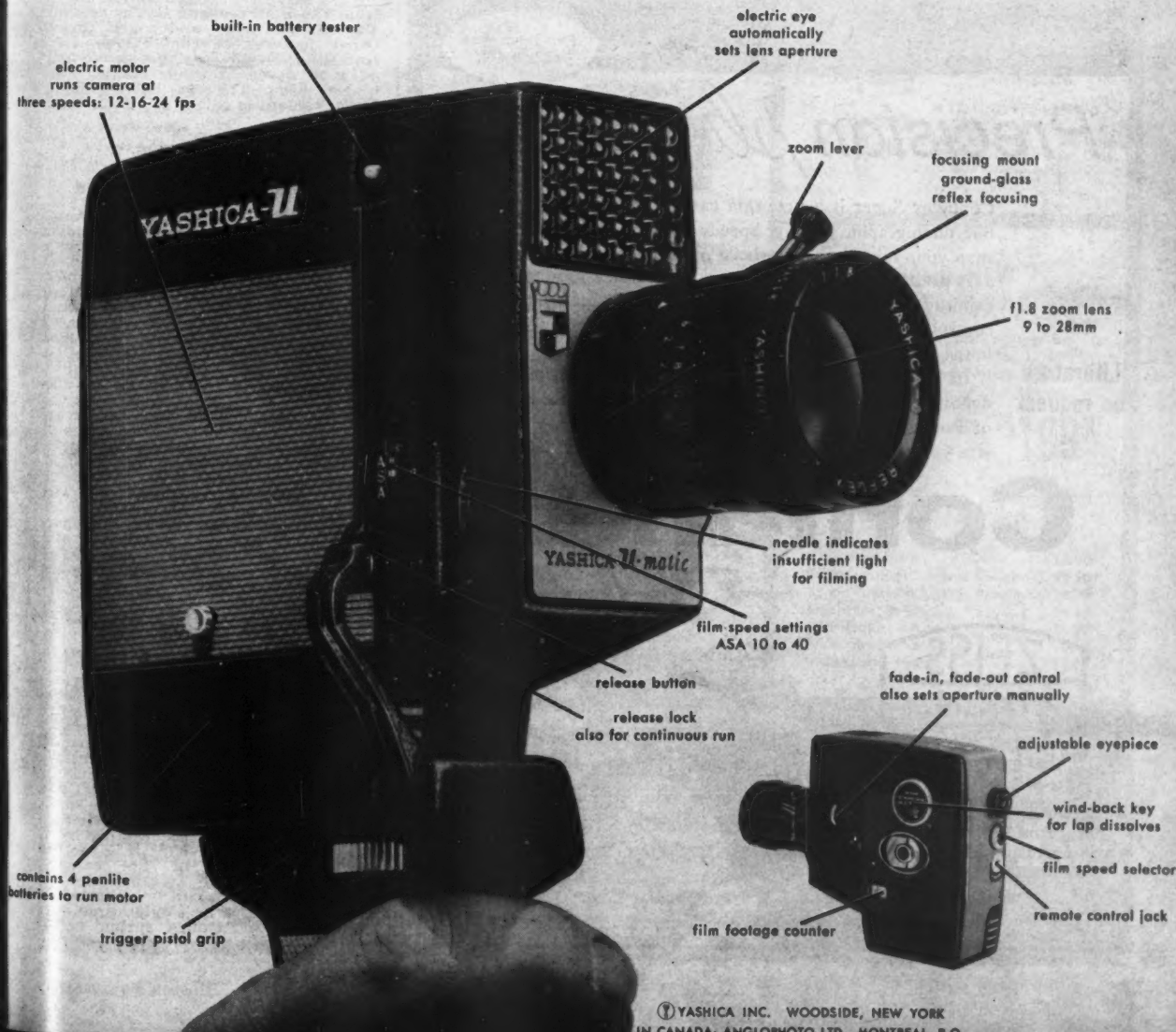
Diaphragm-coupled electric eye automatically sets lens aperture for correct exposure with all films (ASA10 to 40). Meter needle indicates if light is sufficient for filming. Where desired, diaphragm may be set manually. Stopped down lens does not reduce brightness of finder image.

Small, electric motor runs the U-Matic on 4 standard penlite batteries. There is no spring to wind. Camera can be kept running continuously through an entire roll of film, if desired—at 12, 16 or 24 frames/sec. U-Matic may also be operated remotely, and is supplied with a 16 foot remote control cord and switch.

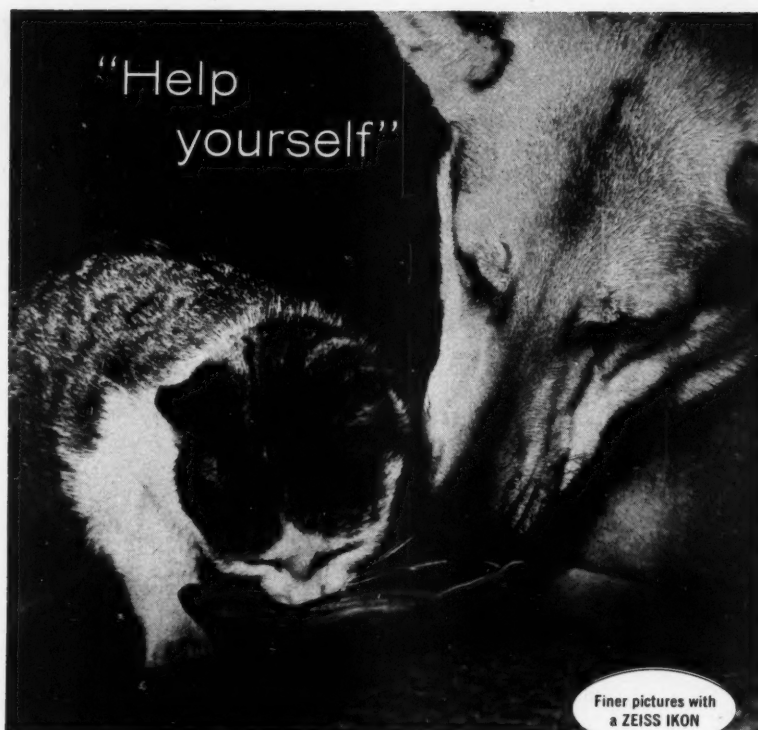
Diaphragm closes-down fully for fade-ins and fade-outs. Film rewind—coupled to footage counter—also permits lap dissolves. See the versatile new U-Matic at your Yashica dealer today! Less than \$130 (trigger pistol grip, extra). Also see the Yashica 8E with f2.8 zoom at under \$90.

YASHICA

U-MATIC



YASHICA INC. WOODSIDE, NEW YORK
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Contaflex Super is a precision camera that insures pictures of fine photographic quality. Speedy manipulation enables you to snap your subject at the crucial moment.

A brilliant viewfinder combines rangefinder, ground-glass and exposure meter indicator. Everything can be seen and precisely controlled while viewing the subject. No parallax—what you see in the finder will be in the picture.

**Literature
on request**

Its lens is the famed Zeiss Tessar f/2.8, noted for needle-sharp definition and complete absence of distortion. Takes a full range of Proxar close-up lenses, tele, wide-angle and 1:1 Pro-Tessar lens—also 400mm Zeiss monocular for dramatic 8x close-ups.

Contaflex

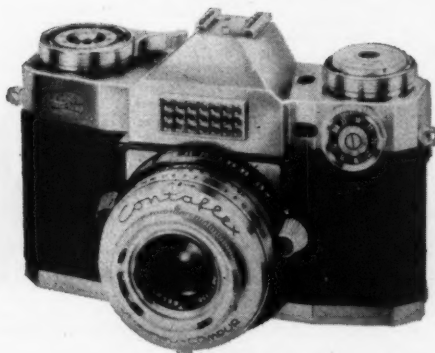
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WEST GERMANY

Contaflex Super is the flexible reflex that makes 35mm photography truly rewarding. See it at your Zeiss Ikon dealer's.

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NEW products

Information and specifications for the products here described are supplied by the manufacturer, and do not constitute tests by MODERN PHOTOGRAPHY.

Nu-Taron Rangefinder 35



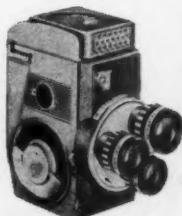
The Nu-Taron Unique 35mm rangefinder camera is equipped with a 45mm f/2.8 lens which focuses down to 3½ ft. and has stops to f/16. Speeds on the Citizen shutter range from 1 to 1/300 sec. and B. The camera also has MX sync. and a self timer. Other features of the Unique are: frameline viewfinder, single-stroke film advance lever, rewind crank, and hinged back. The Nu-Taron Unique 35mm camera is priced at \$39.95; case, \$9.95. Write:
TARON CAMERA CO., INC.
889 BROADWAY, NEW YORK 3, N. Y.

Ricoh Auto-Zoom 8mm Camera



Ricoh's Auto-Zoom 8mm movie camera features a 10 to 30mm f/1.8 zoom lens which focuses down to 3 ft. Focusing and viewing are through-the-lens by means of a beamsplitter in front of the diaphragm. With the built-in electric eye exposure meter for E.I. 10 to 40, you match two needles in the viewfinder to set correct exposure. The camera operates on four penlight batteries which power the gear drive for lens zooming and film rewind. The Auto-Zoom also has an automatic resetting footage indicator; 16 fps operating speed; battery life indicator; and governor controlled shutter speeds. The Ricoh Auto-Zoom 8mm movie camera costs \$139.95. Write:
ALLIED IMPEX CORP.
300 PARK AVE. SOUTH, NEW YORK 10, N.Y.

Brumberger 8mm Turret Camera



Brumberger's Model 1617 8mm movie camera has three fixed-focus f/1.8 lenses mounted on a turret: a 25mm telephoto, 13mm normal, and 6.5mm wide-angle. A photoelectric exposure meter is built into the top of the camera. Aperture is set manually. Camera can be operated at 12, 16, 24, 32 fps or single-frame, and its governor-controlled spring motor
(Continued on page 23)

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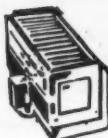
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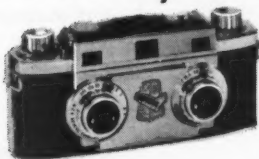
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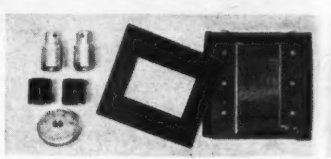

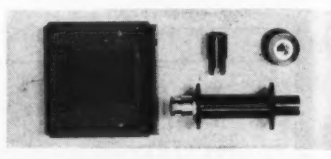
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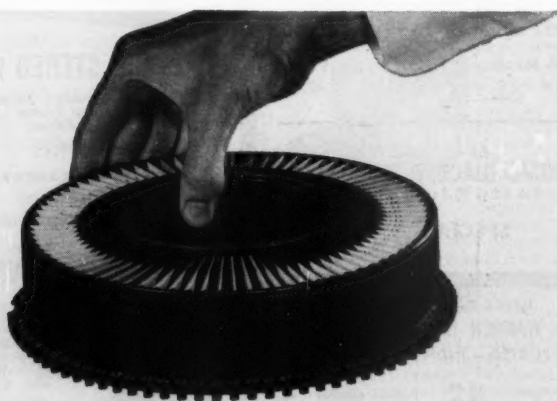
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SHOOT 35MM WITH YOUR 2 1/4 CAMERA

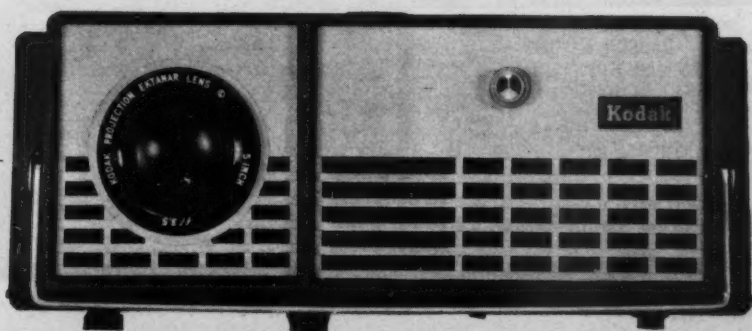
YOU MAY WONDER why, having chosen the 2 1/4 x 2 1/4 format, anyone should go to the trouble of fitting a 35mm adapter. Well, one practical reason is that it lets you shoot Kodachrome (for the same reason we include an adapter for 828 film—8 pictures 28 x 40mm—in our group *at right*). But even if you're interested only in black-and-white, there's another good reason: a 2 1/4 camera with 35mm film makes an ideal portrait-taking combination. First, your 75mm or 80mm normal lens becomes a longish focal-length lens with the 35mm format, thus enabling you to take close-ups free of apparent perspective distortion. Second, the adapter gives vertical pictures when the camera is held normally, and vertical's what you want for head-and-shoulder portraits. Thus the 2 1/4-with-35mm is in many ways better for portraits than the 35mm camera itself!

Of the adapters listed, two are designed for special camera makes and two are almost universal. Until recently, adapters were also made for and sold with the Super Ricohflex and Ricohmatic 225, and these combinations may still be found in some stores.—W.H.J.

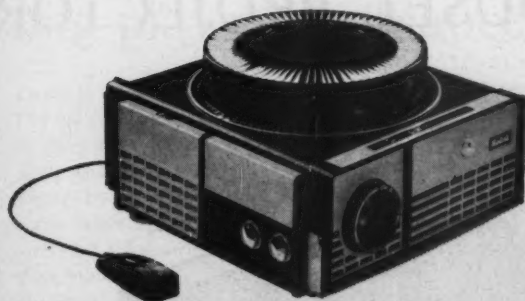
NAME & CAMERA TYPE	
Spiratone Minidapter For All 2 1/4 x 2 1/4 Cameras	
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35mm Adapter For Yashica 635	
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DESCRIPTION	PRICE	NOTES
Film guide plate; four spindle extensions; counter dial; viewing mask	\$5.95	Uses empty 35mm cartridge as takeup spool, so no re-winding is necessary. Takes about 17 exposures on a 20-exp. roll, 34 on a 36. The frame counter is advanced manually
Film guide frame; takeup spool; inner spool knob; extension spindle; counter knob; focusing screen mask (for detachable hood models), ground-glass screen mask (for fixed hood models); sportsfinder mask	Model 1, \$37.95; 2, \$34.95 (for some 2.8 Rolleis, \$26)	Rolleikin 2 fits all late-model 2¼ x 2¼ Rolleis except model T (these models have adjustable pressure plate). Comes without counter knob for 2.8 C, D, E & Tele-Rollei. Rolleikin 1, with special back, fits early models. Takes standard number of exposures per roll
Film guide plate; takeup spool; two spindle extensions	Sold only with Yashica 635 camera, total price \$69.95	Camera comes with 35mm wind and rewind knobs, frame counter, and frame-line ground-glass screen. Takes standard number of exposures per roll
Film mask; takeup spool; four extension spindles; viewing mask	\$4.95	For 828 film. Items in the set vary slightly for different camera models. With some models, it allows 9 exposures per roll. Pictures may be spaced correctly for processor to mount if care is taken with film advance



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For details, turn page ►

PICTURES in a MOMENT

by JOHN WOLBARST

Now there are three electric eye Polaroid Land cameras. Which one should you buy?



I've had a considerable amount of mail from readers who now own Polaroid cameras (non-electric eye models) and want to buy an electric eye type, but don't know which model

they ought to choose. I shall try to explain the advantages and limitations of the Model 900, 850 and J66 electric eye cameras, the three types now available.

First I should like to point out the similarities of the various models. They

all take the Series 40 (large size) roll films and all produce prints of the same size—about $3\frac{1}{4} \times 4\frac{1}{4}$ in. All three develop the picture in exactly the same way. In fact, the rear half of all three cameras (the part behind the bellows) is essentially the same. All three cameras can produce Polaroid prints of excellent quality. If you were to make a series of bright light snapshots of the same person using all three cameras and then mixed up all the prints, it would be extremely difficult, if not impossible, to detect any differences.

Where the cameras do differ radically is in the range of picture taking conditions in which they can be used.

The J66: The simplest to operate

The J66 (price about \$90) was designed to be the Polaroid equivalent of the old box camera. That is, there should be hardly anything to set; you

simply aim the camera and shoot.

The J66 is meant to be used for two main purposes: to shoot snapshots in bright daylight, and to make flash pictures indoors, in the home or office. It is not an all-purpose camera to be used by experts (although even an expert can have fun with it). For the above two purposes it is astonishingly good.

The J66 has a simple, single-element lens arrangement with a fixed opening. It makes adequately sharp, crisp-looking Polaroid prints. However, it is my opinion that these prints would probably not enlarge as well as prints made with the Model 900 or 850, which have better lenses than the J66.

Exposure is controlled only by varying the shutter speed, which is done entirely by the action of the electric eye exposure control. Outdoors in bright light the electric eye automatically sets very high shutter speeds (frequently about $1/500$ sec.), so this camera can stop fast action of children, pets, or other subjects. If the print comes out a bit too dark or a bit too light, there is a simple-to-set "darken/lighten" control which will make the necessary exposure correction for the next picture you take.

Basically, this is a fixed-focus camera. There is one setting for groups and scenics, covering all subjects from about 5 ft. on out. A second setting is provided for closer pictures of people, etc., and covers the range from about

NEW KODAK CAROUSEL PROJECTOR



Kodak
ADAMARK

3 ft. to 8 ft. sharply. There is a simple folding viewfinder of the optical type.

For indoor shooting there is a built-in flashgun which makes better bounce flash pictures more easily than any other flashgun I have ever used. This is a sensational successful device.

Finally, the essential controls of the camera are numbered: (1) is the shutter release; (2) is the lever that sets the shutter for the next exposure; (3) is the film release switch which lets you pull the film tab to start development; (4) indicates the place where you grasp the film tab to pull it so as to start development.

If you simply count 1, 2, 3, 4, and move the numbered controls in that order, it's hard to avoid getting a satisfactory picture.

The J66 was designed around Polaroid's 3000-speed film and you can't use any of the other black-and-white Polaroid films with it. According to Polaroid Corp., it will be able to make pictures with color film, when that is finally marketed. However, I feel that its picture taking range with color will be quite limited—as with conventional box cameras and color films.

Limitations of the J66 are: you can't make a time exposure; it will not synchronize with speedlights; it is not designed for close-ups, technical photography, or snapshots by dim available light. If any of these limitations are important to you, don't pick the

J66. However, it's the first choice for the person who wants to make bright light snapshots and indoor flash pictures with a minimum of effort.

The versatile 900 and 850

These two cameras are virtually identical mechanically. The main difference is that the Model 900 (price about \$160) has the rangefinder and viewfinder combined in a single window which also includes an illuminated white frameline to outline the picture area. The Model 850 (price about \$140) has separate windows for the rangefinder and viewfinder. You must first use the rangefinder window to focus the camera and then shift to the viewfinder window to view the subject. I consider that the Model 900 range-viewfinder system is markedly superior and is worth the difference in price.

Whereas the J66 was designed for a rather limited range of picture taking conditions, the 900 and 850 are designed to operate under the widest range. The electric eye control is the most versatile and sophisticated mechanism of its type on any camera in existence today, regardless of price. It controls both the size of the lens opening and the shutter speed, providing an enormous range of operation.

These cameras accept all types of Polaroid black-and-white roll films. When color is marketed they will take it too, and in my opinion they will be

able to give excellent results under a wide range of conditions.

The 900 and 850 can take pictures with flashbulbs, speedlight and the Polaroid wink-light. In my opinion the built-in flashgun on the J66 gives better results than the flash equipment supplied with the 900 and 850, and any of these flash devices produces better results than the wink-light.

The lenses on the 900 and 850 have three elements and are of excellent quality. In combination with the accurate rangefinders they can make very sharp pictures, even in dim light.

Around the lens there is a bayonet-type fitting, intended to hold accessories such as close-up lenses, filters, etc. These have not yet been marketed, but I am sure some very interesting accessories will be announced.

The 900 and 850 are for people who want to do more than shoot occasional snapshots. These cameras are tremendously able. For all this versatility there is a small price you must pay. That is, you have to learn what the various controls are and how to set them so the electric eye can do its work with most success. They are not complicated, once you take the trouble to learn their uses.

If you now have a non-electric eye Polaroid camera, an exposure meter, a flashgun, filters, etc., and use them all with pleasure and success, you'll enjoy the 900 and 850.—THE END

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Put on the 80-slide tray as easily as you put a record on a turntable. Your slides feed from the tray gently—by gravity. • Never worry about jamming. • Load with any kind of 2 x 2 slide in cardboard or glass mounts up to 1/16-inch thick, mixed in any way. • Slides can't fall out accidentally. • But tray's on top, so you can edit any slide instantly. Simply lift off the locking ring, pluck a slide out, drop another in!

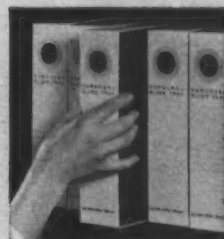


Play it any way you please. Use preset timer when you want an automatic, hands-off show with slide changes at 5-, 10-, or 20-second intervals. • Use 12-foot remote cord—for room-spanning control—with remote forward, reverse, and fine-tune remote focusing in a single handy unit. • Use push buttons on the rear control console of the projector. • Choose hi-lo brilliance by touching either the 300- or 500-watt selector button on the control con-

sole. • When the show is over, tuck away the power cord and remote-control unit in their own convenient compartment. • Lift the folding handle and easily carry the projector anywhere.

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EASTMAN KODAK COMPANY, Rochester 4, N. Y.

TECHNIQUES TOMORROW

by BENNETT SHERMAN

The single-lens reflex of the future,
Part II: The $2\frac{1}{4} \times 2\frac{1}{4}$ design will
approach that of the 35mm.



The $2\frac{1}{4}$ square reflex, whether twin-lens or single-lens, has sometimes been called "the in-between size" camera. Perhaps this was true some time ago when very sharp, high magnification enlargements, such as are now common for good 35mm work, were seldom achieved. The large press and view

cameras dominated the commercial and the professional fields. Today, the $2\frac{1}{4}$ square camera has come into its own, particularly among the so-called "slick-magazine" photographers, and its use is widespread among amateurs. The demands for more versatile and precisely made cameras in this size resulted in the manufacture of such cameras as the Bronica and the Hasselblad. What's the next stage of development for the $2\frac{1}{4}$ format camera?

MODERN's "Behind the Scenes" column in the August issue examined the situation of 70mm film and cassette equipment. Assuming that this type of film becomes more popular, and more advanced cameras will be designed for it, what will they be like?

If we just double the dimensions of the popular 35mm double frame we

arrive at 48×72 mm, or nearly 2×3 in. This is close to the familiar $2\frac{1}{4} \times 3\frac{1}{4}$ format of the famous folding and small press cameras, and a reflex along these lines is going to be relatively large and heavy, hardly a big cousin to the present high efficiency 35mm reflexes. Of course, the Optika reflex works in this size, yet, without disparaging this fine camera, it doesn't look like a good starting point for further advancement into a new field. The square format of the Rollei and the two SLR's seems more fruitful.

The new camera design would have the center section, with reflex mirror and ground glass, something like that of a Hasselblad or Bronica, only slimmer. On top may be a new lightweight pentaprism of plastic, or new, radically improved metal mirrors. On each side of the center section would be a film chamber to fit the 70mm cassettes. A large, easy-to-operate rapid advance lever would be found in the usual place above the take-up spool, together with a frame counter. On top of the other chamber might be the rewind and the shutter-speed dial (if this is to be a focal-plane shutter camera). The shutter release and the focusing lever or knob would be found in places best suited for rapid and convenient use when the camera is at eye level.

Does all this sound familiar? Yes, of course: it's like a big version of one of the fine 35mm single-lens reflexes

For the man who'll settle for



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we have today. There are very strong indications that the coming larger reflexes are going to be much like them. (There was a camera that fitted much of this description—the Reflex Korelle—but it never got to the eye-level stage or acquired some of today's very desirable features.)

A balance of conflicting needs

If our new, advanced camera is going to be built, it will require some very skilled engineering, particularly in compacting some of the mechanical and optical mechanisms. The need for sturdy mechanisms, particularly at high shutter speeds, and precision will tax the engineer and the manufacturer heavily. Weight, too, will have to be minimized.

What kind of lenses will we find on the future 70mm reflex? If we use the criterion that the normal focal length is equal to the diagonal of the picture format, then for the 2 1/4 square picture, the focal length comes out to 81mm. Recently, some of the manufacturers of the 2 1/4 SLR chose 80mm as the normal focal length. I imagine that, because the design and manufacture of a high-quality lens at a speed of f/2.8 gets to be a severe problem at focal lengths much shorter than this, 80mm will probably be the normal focal length. The severe problem of increasing the lens speed beyond f/2.8, together with the improving of film

speeds without excess graininess, pretty well settles the issue of lens speed at f/2.8. Shorter focal lengths are already being built, as well as longer lenses up to and beyond 250mm or 10 in. Remember, these lenses will have to cover a film area very much greater than the 35mm double frame of today. These wide-angle and long-focus lenses may be limited to f/4.5.

In any case, we can expect that the future 2 1/4-in. or 70mm single-lens reflex will have some of the lightweight, compact and efficient characteristics of the up-to-date 35mm SLR's of today. The key features are going to be compactness and convenience of operation.—THE END

DO IT, DO IT, DO

EMERGENCY CHANGING BAG. If your film jams when you're miles from anywhere and have no changing bag, get in the shadiest spot you can find and take your coat or jacket off! Fasten all the buttons and insert your arms backwards through the sleeves from the outside. Then hold camera in both hands and roll the tail of the coat around your hands, leaving just enough space to work in. The layers of your coat will provide adequate darkness.

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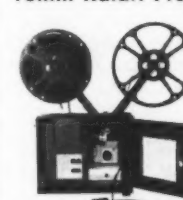
(Continued from page 16)

runs 6 ft. per winding. Frames in the viewfinder show field of view for each of the three lenses. Other features: footage counter, three built-in filters, optional pistol grip. The Brumberger Model 1617 8mm turret movie camera costs \$59.95; pistol grip, \$5.95. Write: BRUMBERGER SALES CORP., 34 34 ST., BROOKLYN 32, N.Y.

Rapidweld Process for 8mm Film

Rapidweld film restoring, formerly available only for professionals using 16 and 35mm movie film, is now available through photo dealers for 8mm film users. The chemical treatment is designed to remove scratches, dirt, abrasions, brittleness and other imperfections. Rapidweld processing costs 3¢ per foot of 8mm movie film. Write: RAPID FILM TECHNIQUE, INC., 37-02 27 ST., LONG ISLAND CITY 1, N.Y.

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The Kalart/Victor Model 70-0 16mm movie projector has a rheostat control which makes possible operating speeds from 10 to 27 fps. It is equipped with a 2-in. f/1.6 flat-field lens and a 750-watt projection lamp, and has a reel capacity of 2,000 feet. Other features include: forward, reverse and still projection; 5-foot remote control cord

(Continued on page 52)

or everything... Kodak Zoom 8 Reflex Camera

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You can zoom manually, too, by turning the dial you see in the small

illustration. It also lets you set the focal length of the lens at any point from wide-angle to telephoto.

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EASTMAN KODAK COMPANY, Rochester 4, N.Y.

MOVIE VIEWER

WILLIAM JOHNSON

A new movie provides not only rich entertainment but an object lesson in the use of color.



This special movie issue coincides happily with the release of a rather special movie: *Loss of Innocence*, directed by Lewis Gilbert and photographed in color by Frederick A. Young.

This movie is not only a sheer pleasure to watch, but it can prove an inspiration to anyone who makes movies himself. Unlike most color films, which daunt the amateur with their lavish effects, *Loss of Innocence* relies on simplicity and imagination to achieve its spellbinding color photography and lucid camera work.

The movie is based on a novel called *The Greengage Summer*, which has a good and convincing theme (the development of a 16-year-old girl into womanhood) set in a romanticized and sometimes preposterous plot (four children are vacationing in France when their mother falls ill, and they are left on their own at a country hotel, where a charming, mysterious Englishman begins to transfer his interest from the hotel proprietress to the 16-year-old). The screenplay wisely emphasizes the main theme as far as possible, and irons out all of the book's rather affected flashbacks. The resulting blend of realism with a vacationer's dream simply begs for color.

This is already a rarity. Many movies these days are shot in color not because the action or images need it but because color is a box-office attraction. Even when this inessential color is good to look at, it may actually be less effective than black-and-white. (I will discuss this question in detail in a

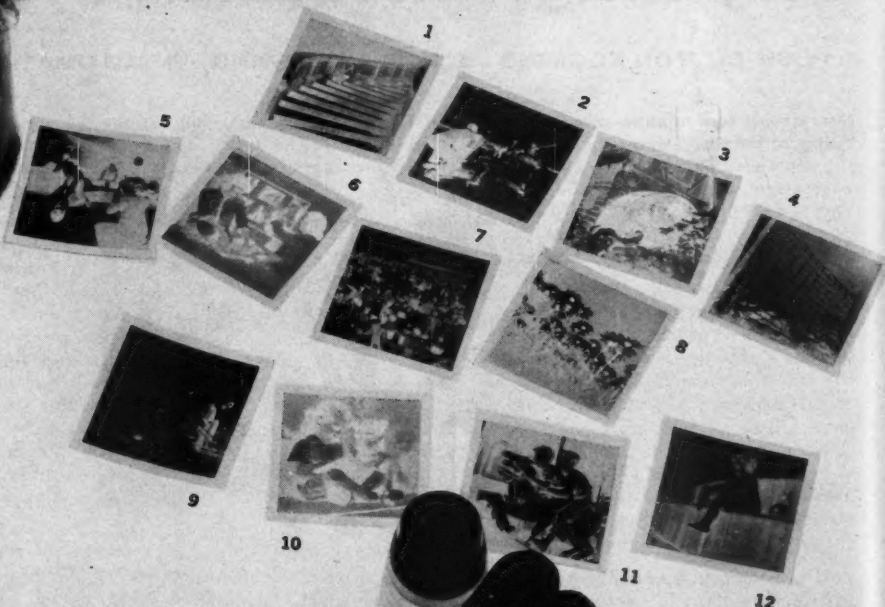
future series of columns on the use of different films.) In *Loss of Innocence*, not only is the color beautiful, but it plays an integral part in the action.

For his film stock Young chose Kodak 5250, the most commonly used of the 35mm films that go under the general name of Eastmancolor. It's a negative film that's balanced for 3200K tungsten lighting with an E.I. of 50 and is used in daylight with an 85 filter and an E.I. of 32. As I write this, Young is in the Jordanian desert fighting sand and over-100° heat to shoot *Lawrence of Arabia*, but Technicolor in London, who processed *Loss of Innocence*, tell me that he used no special techniques except an Aero 1 filter for shooting the few night scenes in day-



Directing *Loss of Innocence* on location at Reims, France (cathedral is in background), Lewis Gilbert, in dark clothes, stands in front of camera. Note man with sound boom, right.

To solve 12 problems:



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1. The two sisters, 16-year-old Joss (Susannah York) and 13-year-old Hester (Jane Asher) on the hotel balcony. Note summery background, use of diffuse reflected light in foreground.



2. The mysterious Englishman (Kenneth More) takes the children around Reims cathedral. The artificial lighting was controlled to blend with light from candles and stained-glass windows.



3. Hester looks on disapprovingly while Joss drinks wine provided by the hotel kitchen boy (David Saire). Low-key lighting here stresses the rich browns of furniture, the red of the wine.

light. Whereas American cinematographers set up their lighting by a predetermined key-to-fill ratio, Young followed the standard British practice of taking a highlight reading and balancing the fill lighting by eye through the viewfinder.

The movie exteriors were shot on location in France (see picture *opposite*), mostly in the lush countryside around Reims, and the keytone to these exteriors is a range of luminous greens. Still no. 1, though in black-and-white, suggests how the countryside was used as a recurring background even to scenes taking place at the hotel. The garden of the hotel, with its dense

foliage of trees and shrubs rippling in the breeze to create a dappled, shimmering background, was used in many scenes to heighten the lyrical, dream-like atmosphere. There were also some shots of a flock of doves in the garden, a flutter of blazing white that skillfully reflected the girl's turbulent feelings.

The studio-made interiors are keyed to warm, muted tones: the browns of wooden panels and furnishings, the deep reds of wine bottles, and so on. This contrast with the bright greens of the exteriors preserves the movie from monotony while sustaining the general warmth of the colors.

The skillful use of color in *Loss of*

Innocence goes beyond these general keytones and is bound up with the actual camera work. Lewis Gilbert's technique is of classical purity. When he moves the camera—which is not too often—he does so gently and unobtrusively: he pans to follow action or discover a character previously out of frame, and he dollies mainly for emphasis, closing in.

His use even of the close-up is sparing; but when he does use it, the impact is certain and is conceived in terms of color. For example, there is a sequence filmed in Reims cathedral where the mysterious Englishman is

(Continued on page 44)

open 1 box of Kodak Polycontrast Paper

Here are 12 negatives—some flat, some contrasty, some average. To get fine prints from all 12, you'd need many boxes of regular paper . . . but only *one* box of Kodak Polycontrast Paper.

You could print negatives 1, 2, 3, and 4, which are of average contrast, on Kodak Polycontrast Paper just as it comes from the box. No filter needed.

For those contrasty, soot-and-white-wash 5th, 7th and 11th negatives, slip a No. 1 Kodak Polycontrast Filter in your enlarger. The print you make will be rich, full-scale, as if you had used a "soft" No. 1 paper.

Negatives 6 and 10 are soft and flat. The No. 4 Kodak Polycontrast Filter will let you print rich blacks and sparkling whites even though the negative promises very little.

Number 8 negative is *almost* normal, but just a little contrasty. Using regular grade 2 paper could leave you with blocked up whites. Grade 1 might be a trifle too soft.

Negative 12, on the other hand, needs a subtle contrast boost. More than grade 2 paper can offer, less than grade 3.

Answers to both problems: half-grade Polycontrast Filters—No. 1½ for negative 8, No. 2½ for negative 12.

In all, every sheet of Kodak Polycontrast Paper gives you seven contrasts—including half-grades 1½, 2½, 3½, not available in regular papers.

Selective contrast control. Polycontrast Paper's selective contrast control is very handy for the likes of negative 9, in which the foreground is very contrasty, the background very flat.

Just expose the contrasty area through a No. 1 filter while dodging the other area. Then expose the flat area through a No. 4 filter for a print as normal as blueberry pie.

Kodak Polycontrast Paper has the warm-black tone and ample speed of Kodak Medalist Paper. Kodak Polycontrast Rapid has cooler blacks and



high speed similar to Kodabromide Paper. Kodak PolyLure Paper has the perfect-for-portraits warm-brown tone of Kodak Ektalure Paper.

For your next printing session, buy a 100-sheet box of a Kodak Polycontrast Paper instead of four 25-sheet packages of regular paper. Save up to \$1.40 in 8 x 10 size! Or make that a 500-sheet box and save up to \$14!

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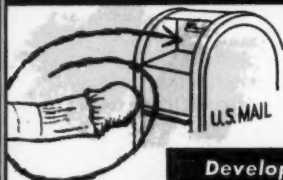
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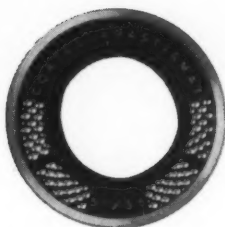
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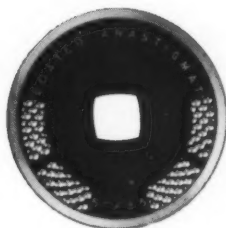
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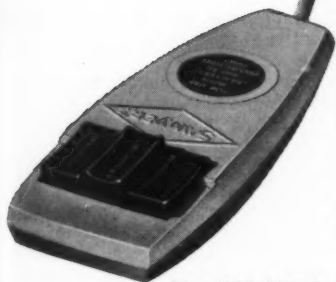


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Protecting your slides, Part II:
Methods of mounting your slides
with glass.



At the risk of offending a few 35mm enthusiasts, I'm going to stress the 2 1/4 mounting problem, which is larger and more acute than the 35. However, the methods of slide

mounting described here can apply also to 35mm.

It's only in comparatively recent times that a number of processors have begun to return processed 2 1/4 slides in cardboard mounts. However, although these are fine for intermittent use, they do have drawbacks. Their total unsupported transparency area is far larger than that of 35mm slides. Therefore, all the aches and pains of the 35mm cardboard mount are multiplied in the 2 1/4. In the heat of a projector, the large film area eventually buckles. The narrow cardboard margin bends out of shape, jamming the slides in the changers. Remounting your best slides (if you want to preserve them) seems to be the only logical permanent solution. Here are a few possibilities.

For do-it-yourself mounting

1. *Kimac Acetate Protectors.* Although I discussed this in Part I, I mention it here again as a possible method for the 2 1/4 x 2 1/4 camera fans. (See August 1961, page 40.)

2. *Glass, Masks and Tape.* This old tried and true method remains the cheapest and most versatile way of getting the job done. A great number of odd shaped masks are available, allowing you to crop your slides for more interesting compositions. (See August, page 40.)

3. *Binders that slide together.* These are easy to use. You simply slide the upper half of the binder into a groove in the lower half (with your slide sandwiched in between). However, these binders have a tendency to slide apart if the carrier springs are tight. This can be prevented by applying a small piece of cellulose tape across the open end of the binder frame.

4. *Binders that snap together.* These consist of an upper and lower metal frame. Since I've found it a bit tricky to get curly film and glasses to stay put while the upper frame is snapped

on, I've worked out the following procedure. First, place transparency and glasses into the recess in the lower mount half. Hold this in place with a finger of the left hand. Slip the index finger of the right hand into the opening in the upper mount half. Next lower this half into place, at the same time placing your right index finger on the glasses so they'll stay put. Now use your left hand to line up both halves. The entire assembly can now be picked up and snapped together. 5. *Metal Frame, Masks, and Glass.* Called the Emde Binder, this type is offered only by Emde Products Inc., 2040 Stoner Ave., Los Angeles 25, Calif. You simply slip the cardboard mount between two sheets of extra thin glass, and slide into a metal frame. Then slide the whole assembly into place in a channel in the binder frame and close the mount by bending over the metal flap.

Slide mounts are made in both metal and plastic. Metal is stronger and more durable and won't shatter if dropped, nor will it warp under the heat of a projector lamp. On the other hand, plastic is much lighter and won't bend out of shape.

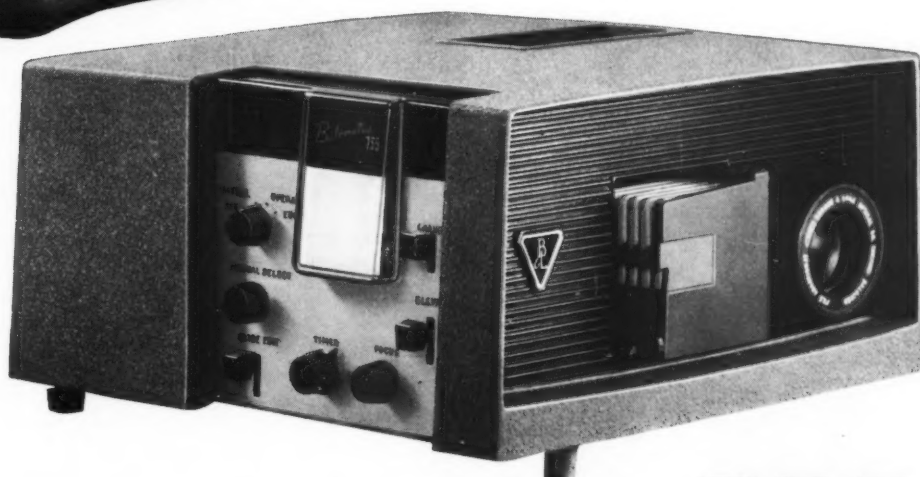
6. *Fiber and Glass.* Called Type-On, the binder consists of a fiber frame, glasses and a gummed paper mask, on which you can type or write identifying information. Should you accidentally drop a slide, the fiber will absorb the shock and minimize the risk of breakage. To use Type-On, you wet one half of the mask and glue the frame into place. Insert one glass while the mask is still damp, put the transparency in place and insert the second piece of glass. There is a paper flap which you must moisten and fold over to seal the mount. Essco Type-On binders are sold with the frame and paper unassembled, so that you can type data on the mount before putting it together. Every box of 100 or more Type-On binders comes with a jig which aids in aligning the fiber frame and paper. After hard continued use, the fiber mounts tend to fray and the glue dry out. To prevent the mounts from coming apart, try dipping the fiber area (not the glass) into Miracote.

Because a binder thickens the slide sandwich, some brands may jam your slide projector. Therefore, test your projector with a sample slide binder on one or two slides before investing in a large supply of the binders.

For a full list of the names and addresses of slide mount manufacturers, send 10¢ to Slide Mounts, MODERN PHOTOGRAPHY, 33 W. 60 St., New York 23, N.Y.—THE END



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the MOVIE MAKER

by MYRON A. MATZKIN

**Sound, Part I: What can it add to
your movies and just how good
will it be?**



Like many amateurs you may already have a latent interest in 8 mm sound movies—but with some fairly powerful reservations. So, in an attempt to clear up some of those reserva-

tions, we're going to devote a series of columns to the question of sound.

Probably one of your biggest questions concerns equipment. Two systems for 8mm sound have come forward in recent years—synchronized tape and magnetic stripe on film. (Some amateurs use records and turntables, but good sync is very difficult.)

The ultimate position for the sound obviously is on the film. It simplifies synchronization, cuts down on the amount of equipment, and prevents unfortunate accidents like the wrong sound with the right film.

For magnetic sound on film an iron oxide stripe—a 30-mil wide version of the 1/4-in. tape you use in your home tape recorder—is laminated or glued to the sprocket side of the film. The sound is recorded and played back just the way it is in your home tape machine. The 8mm sound projector serves as both recorder and playback instrument. The film passes through a regular series of sprocket drives, the film gate and a magnetic sound head.

Several projectors have been either placed on the market or shown at photographic trade shows and are to be distributed shortly. For details on existing machines see MODERN, October 1960. In addition to the projectors, Fairchild Instrument and Camera Co. has marketed an 8mm single-system magnetic sound camera.

Two types of 8mm magnetic sound-on-film projection equipment are available. One type is designed to be added to specific silent machines. The other is an integral projector/sound unit.

The add-on units have the advantage of splitting up your investment to meet the limits of your budget. You can buy the silent machine and then add the sound section—usually an amplifier sound head and speaker—when you feel you need and can afford it. The aggregate price for the exist-

ing add-on units tends to be somewhat higher than for complete units by the time you've finished. Add-on units are marketed by Nizo, Bolex, and Agfa.

The complete units tend to be somewhat easier to handle—since everything is in one package. Obviously, you'll also have to open your billfold a little wider than for a silent machine. But despite having everything in one piece, 8mm sound machines weigh considerably more than silent units—the lightest is around 17 lb. and the heaviest around 30 lb. Integral sound projectors are made by Fairchild, Eastman Kodak, Fujica and Tandberg.

But just how good is 8mm magnetic sound in general? We think it's often a lot better than most 16mm optical sound tracks—and often superior even to some 35mm theatrical releases.

You probably already know that sound consists of vibrations that vary in frequency with the level of the sound. Low or bass sounds vibrate less frequently than high or treble sounds. The number of vibrations or cycles per second indicates the sound range.

Most good high fidelity equipment has a rating of at least 40 to 15,000 cps, almost beyond the range that the

MOVIE TIP OF THE MONTH: Want insurance against lost film at the processor? Write your name and address on a large white card and film it with the last 6 in. of footage. Use a close-up lens if your camera won't focus close enough to fill the frame.

human ear can hear. The best 8mm magnetic sound equipment can handle a frequency range of about 70 to 7,500 cps. Sound above or below that range is liable to be lost or distorted. However, the range does encompass moderate bass and treble tones.

But obviously, 8mm magnetic sound on film doesn't fall into the high fidelity class. One reason is the narrowness of the stripe on which sound is recorded. The wider the stripe the better the recording. For instance, some 16mm machines using a 100-mil stripe have virtual high fidelity performance. Another reason is the speed at which the stripe passes over the sound head. The faster it moves, the better the sound. While many machines will transport tape at 3 2/3 in. and 7 in. per sec., pro-

(Continued on page 34)

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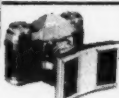
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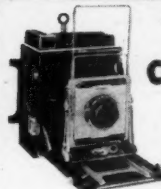
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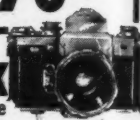


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1" Kodak Ektra F1.9 high-speed.....	used	34.50
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Kodak F4.5 telephoto.....	used	39.50
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B&H Sportster, 134V, F1.8, excellent.....	used	15.00
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Bolsey R, F1.8, var. speed, still.....	used	19.00
B&H with Pan-Cinor Zoom lens.....	used	39.50
Canon Zoom 8, Reflex, Exp. Meter F1.4.....	used	19.00
Delux Embassy, Mag., F2.5, var. speed.....	NEW	19.00
Simo 8S, Electric Eye Zoom lens.....	used	3.95
Fairchild Sound Camera.....	used	158.50
Fairchild Sound Projector.....	used	169.50
Kodak Reflex Zoom 8.....	used	109.50
Kodak Mag. 8, F1.9 foc. mount.....	used	15.00
Konica Zoom, battery-drive.....	used	39.50
Revere 84, Turret, F1.9, roll, var. speeds.....	used	34.00
Revere C1 or C4-3, Electric Eye, F1.0.....	NEW	99.50
Revere C2 or C4-4, 3-lenses El. Eye.....	used	39.95
Revere 40, Mag. F2.8, Zoom.....	NEW	19.00
Sekonic Elmatic, F1.9, 3 lenses.....	used	34.95
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Sankyo R, 3-lens Turret F1.0.....	NEW	36.50
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Kodak Ambassador projector.....	used	188.75
Sekonic 30C projector forw., reverse, case.....	used	34.95
Koyosone K100, forw., reverse, case.....	used	24.50
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1/2" Wollensak F1.9.....	NEW	9.95
3/4" Wollensak F1.8.....	NEW	36.50
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11mm Speed F1.1 tele.....	NEW	26.50
Elget Zoom lens for 8mm movies.....	NEW	36.50
Elget Synchronix Electric Eye lens for all 8mm cameras, F1.1.....	used	14.95
Viatscope Wide Screen lens.....	used	7.50

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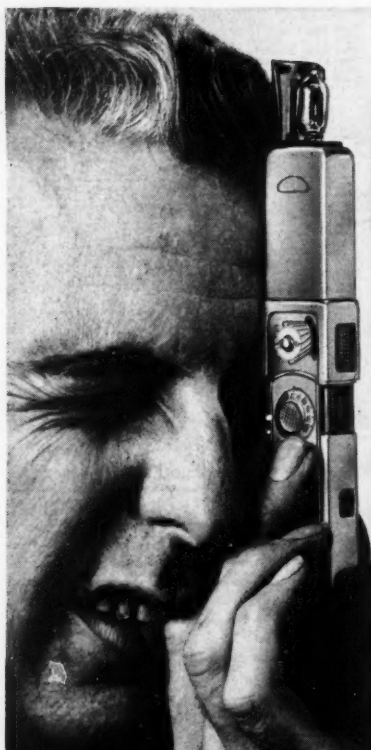
2 1/4x3 1/4 Ruch Press, F4.5.....	used	31.00
3 1/4x4 1/4 Auto Speed Graphic Tess. 4.5.....	used	39.50
3 1/4x4 1/4 Speed Graphic Tess. 4.5.....	used	39.50
4 1/4x5 1/4 Auto Speed Graphic F4.7, Rdr.....	used	54.00
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5 1/4" Zeiss Tessar F4.5 Cpl.....	used	15.50
5 1/4" Zeiss Tessar F4.5 Cpl.....	used	24.50
7" Aero-Ektra F2.3.....	used	28.00
8" Goss Dugma F4.7 B&H.....	used	129.95
10" Commercial Ektra F3.5 synch.....	used	43.50
90mm Angulon F6.8, W.A. Compur.....	used	39.50
120 Angulon F5.8, W.A. Compur.....	used	39.50
10" Wollensak F1.6 Telephoto.....	used	38.50
12" Tele-Xenar F5.5 synchro shutter.....	used	99.50
12" Redar F4.5 Betax telephoto.....	used	54.00
15" Wollensak F1.6, Telephoto.....	used	19.95
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21mm Higon F4.5 Super W.A.....	used	106.50
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35mm Nikkor F4.5 W.A.....	used	84.75
35mm Zeiss Biotar F4.5 W.A.....	used	106.50
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50mm Zeiss Sonnar F1.5.....	used	99.50
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ultra MINIATURE

BY JOSEPH D. COOPER

When, why and how to shoot close-ups: special techniques for proper framing, maximum sharpness.



In Hollywood versions of international spy ring thrillers the ultra-miniature camera plays an indispensable role, primarily as a tool for copying secret documents. Actually, this presentation of the ultra-

traminature is not at all inaccurate, but you don't have to be an FBI man to put the camera to similar use.

An almost infinite number of subjects call for the close-up treatment: flowers, coins, a detail of an ornately carved door and stamps, in addition to books or documents. It's even necessary to come within a few feet of your subject to make a portrait if you want to fill the frame with the head only, since many of the ultraminatures have short focal-length lenses.

The GaMi, which is the only ultraminature with a rangefinder, focuses down to 20 in. with the Prox supplementary lens. The Mamiya-16 focuses to 12 in. and the Minox to 8 in. With both the Mamiya and Minox, distance must be estimated or measured. The beaded, 24-in. distance chain which comes with the Minox is an extremely useful device. The beads are set at distances of 8, 10, 12 and 18 in. from the camera base. All you do to use it is frame your subject, measure off the proper distance on the chain, and set focus as indicated.

With the Minolta-16 and other fixed-focus cameras, your only distance control is stopping down the lens to extend the limits of depth of field. At f/16, an object about 3½ ft. from the camera will be acceptably sharp.

A set of close-up lenses is available for the Minolta 16-II. With the lens set at f/2.8 and the No. 1 lens, objects between 3.9 and 4.9 ft. will be sharp. As you stop the lens down, the depth of field increases, until at f/16 the depth of field is from 2.5 to 15 ft.

The range of sharp focus with the No. 2 lens is from 2.3 to 2.6 ft. at f/2.8; from 1.8 to 4.1 ft. at f/16.

All the above cameras have automatic parallax correction except the Mamiya-16 Automatic and the Minolta-

16. With automatic parallax correction, you can be certain that the view seen through the camera's viewfinder and that recorded on the film will be the same. Since parallax error becomes more of problem at close focusing distances, I suggest running a steel tape from the lens to the center of the image area if you are working with the Minolta-16 or the Mamiya-16 Automatic. If either of these cameras is mounted vertically on a tripod, the usual technique for copying documents, you can use a simple plumb line.

The depth of field of even the relatively short focal-length ultraminature lenses is not particularly great when they are used close up. The 15mm f/3.5 Minox lens when focused at 8 in. has a depth of sharp focus extending from 7¾ to 8½ in.: ¾ in. in all. Therefore, the camera must be on a solid support, preferably a tripod, to accurately maintain the correct camera-to-subject distance. All parts of the subject should be on the same, or very near, planes: if not, part of your subject will be out of focus.—THE END

MOVIE MAKER

(Continued from page 30)

fessional soundmen in this country usually employ machines at 15 i.p.s.

Compare this to a magnetic sound projector operated at either 16, 18 or 24 fps—the three speeds at which magnetic sound on film is recorded and played back. At 16 fps the stripe is moving at the rate of 2½ i.p.s. At 24 fps the rate is 3 9/16 i.p.s. These speeds cannot be changed to accommodate the needs of optimum sound quality.

However, many of these handicaps can be overcome by good amplifiers, sound heads and speakers. And in any case, you don't really need high fidelity performance for motion pictures.

All the machines we've tested—Bolex, Tandberg, Kodak—are capable of giving good, clean sound, with an acceptable range of high, low and middle tones. The frequency range is sufficient to enhance and give greater reality to the screen image.

One way to improve the quality of sound from any of the 8mm machines is to add a larger speaker. Also, the microphones that come with them leave something to be desired. Some of the mikes aren't capable of handling the range of the projector's amplifier. An investment in a new mike often improves reproduction.—THE END

SOUNDTALK

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Make a Matte Box for Special Effects with Your Zoom Lens

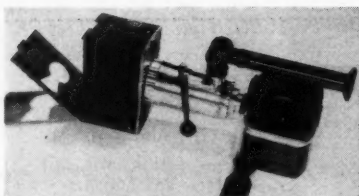
A matte box looks for all the world like a rectangular lens shade—but it can expand the special effects potential of your movie zoom lens. Professionals use matte boxes as lens shades, but also as mask holders for many of special effects you see on TV or in movies.

Combining a matte box with your zoom lens can lead to some interesting sequences. For example, you can make a shot that starts with the audience figuratively looking at the screen image through a keyhole. Only the central portion of the image is visible. Then the shot travels through to show the entire scene.

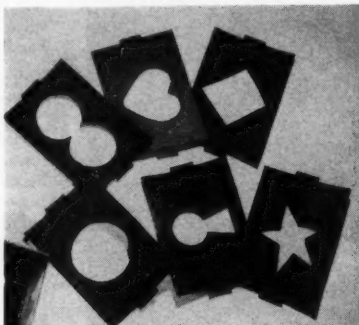
Here's how it's done. A matte box is placed on the lens mount. A mask with a keyhole shape cut out of its center is placed in the box as shown below.

As you shoot with the zoom at wide-angle the sides of the mask block out the sides of the frame so that only the action directly in front of the keyhole shape registers on film. As you zoom to tele, the lens' angle of view narrows, covering only the keyhole area and eliminating the masking effect.

Your matte box must be wide enough not to cut off the frame edges at your zoom's wide-angle position. The plan shown below is applicable to lenses having a minimum focal length no shorter than 8mm. Make it either from fairly heavy cardboard or do-it-yourself aluminum (which can be cut out and shaped with ordinary carpenter tools).



Matte box with mask on camera.

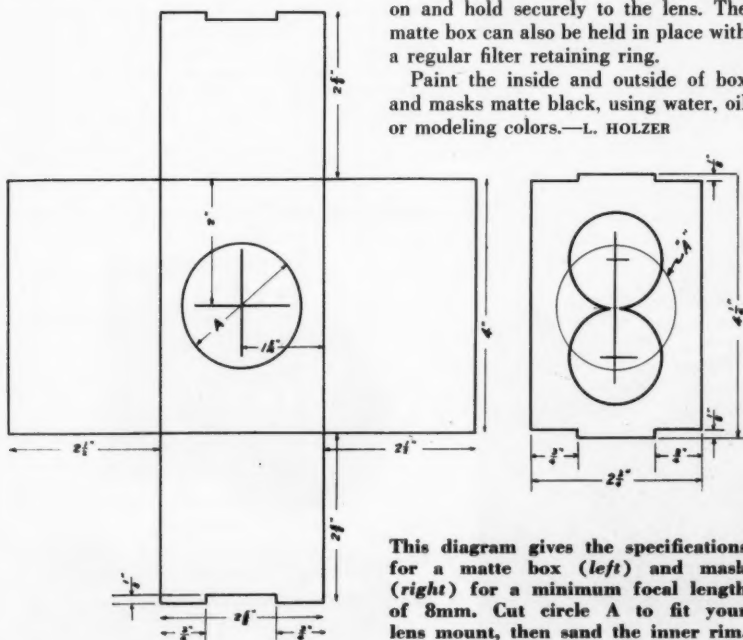


Some possible shapes for the masks.

Make the masks from the same material. The circle A in the mask illustrated merely indicates the rough limits of any patterns you cut in the center.

Once you've cut the matte box, measure the outside diameter of your lens. Then cut out a circle of the same diameter at the rear of the matte box. You can build up the rear of the matte box with additional rings laminated one on top of the other so that the box will slip on and hold securely to the lens. The matte box can also be held in place with a regular filter retaining ring.

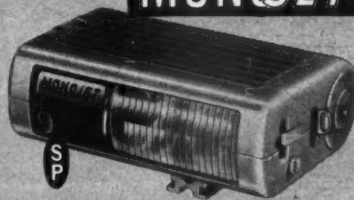
Paint the inside and outside of box and masks matte black, using water, oil or modeling colors.—L. HOLZER



This diagram gives the specifications for a matte box (left) and mask (right) for a minimum focal length of 8mm. Cut circle A to fit your lens mount, then sand the inner rim.

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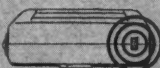
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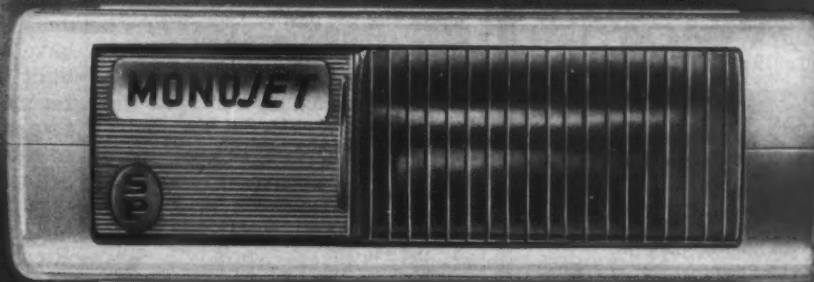
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35MM

BY JOHN WOLBARST

How to choose a 35mm camera,
Part IX: Sorting out some of the
SLR convenience features.

In Part VIII of this series I suggested that focal-plane-shutter 35mm single-lens reflexes could be classified into four rough general groupings (basic, upgraded, advanced, deluxe) according to the presence (or lack) of mechanical features contributing to convenience in the use of the camera for general photography. These features are mainly concerned with: the closing and opening of the lens diaphragm; the movement of the viewing mirror; the design of the viewing and focusing arrangements. Of these, I think the diaphragm movements most clearly indicate into which of my four groupings a camera fits. So, let's first consider some diaphragm designs.

In the following discussion, I'm referring to an SLR with its "normal" lens as supplied by the manufacturer. Where I intend to include accessory lenses I'll make that quite clear.

The theoretical picture taking cycle of a single-lens reflex is: (1) Open the lens to widest aperture for viewing and focusing. (2) Close the diaphragm to the desired f-number. (3) Shoot. As the shutter release is pressed the viewing mirror flies out of the way to permit the exposure. (4) Advance the film and wind the shutter for the next exposure. (5) Get the mirror back into viewing position. (6) Open the lens to widest aperture to view and focus for the next shot.

In the basic 35mm SLR these are all separate manual operations except 4 and 5—the mirror is ordinarily coupled to the film advance/shutter wind mechanism and it returns to viewing position as the shutter is cocked.

No matter how you slice it, this is a remarkably cumbersome routine to have to go through in order to shoot a picture. And for some types of everyday pictures such a routine may be an almost impassable obstacle.

The upgraded SLR

Providing that the camera's shutter release is properly situated, it is possible to fit a basic SLR with a lens incorporating in its mount a spring-loaded diaphragm so designed that it

(Continued on page 40)

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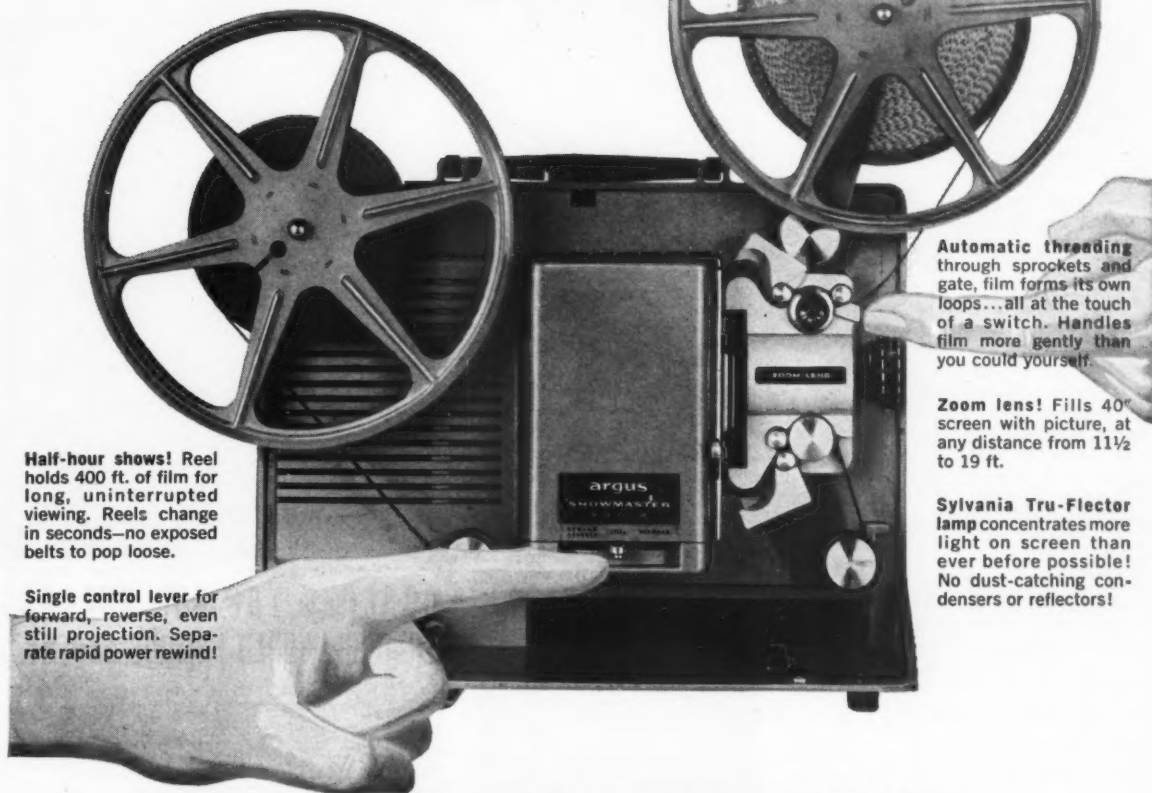
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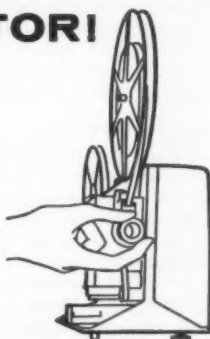
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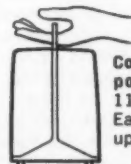


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35MM

(Continued from page 38)

automatically snaps closed to the desired f-number when the shutter release is pressed.

In this design, you actually press a release button on the lens mount, which in turn presses the release on the camera. After the exposure the lens is reopened wide manually. This cocks the spring mechanism inside the mount.

By my definition this is now an *upgraded SLR*. Its identifying characteristic is: *The lens has an externally actuated, self-closing, manual-opening diaphragm*, with all the mechanism outside the camera body. The mirror may return to viewing position automatically, after the exposure, or when the film is advanced.

This is the simplest camera type to offer the most important and essential of the convenience features—the self-closing diaphragm. It is a surprisingly usable design. There are many self-closing diaphragm accessory lenses, in a wide range of focal lengths, which can be fitted to such a camera.

For macrophotography (ultra-close-ups) this apparently crude system offers distinct advantages over some of the more sophisticated self-closing diaphragm designs, at least at present. By means of suitable push rods or a double cable release you can still retain the self-closing diaphragm feature even when using extension tubes or a bellows. This is not possible, at present, with some of the most elaborate and expensive cameras.

A minor variation of the system used in the upgraded SLR is that the diaphragm is spring-loaded to open instead of to close. As you press the release button your finger pressure closes the diaphragm first, and then depresses the camera's shutter release. When you remove your finger the spring reopens the lens wide. I think that addition of this type of lens does not essentially change the camera's nature, so I consider such a one still to be in the upgraded group.

The advanced SLR

In the upgraded SLR the mechanism to close and open the diaphragm, however effective, is obviously an afterthought. In contrast, the *advanced SLR*, by my definition, is the simplest camera design that has the mechanism for both movements built into the camera body and lens mount as an integral part of the design. It has the following identifying characteristics: *The diaphragm is internally actuated, is self-closing, and opens automatically or when the film is advanced.*

In the advanced SLR the picture taking cycle is as follows: (1) Operate the film advance/shutter wind lever, which opens the diaphragm wide for viewing and focusing. On some cameras this also drops the mirror to viewing position. (2) Shoot. The mirror flies up, the diaphragm closes

(Continued on page 42)

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(Multiple-exposure speedlight photo by Ralph Samuels & George Waldheim—NYI)



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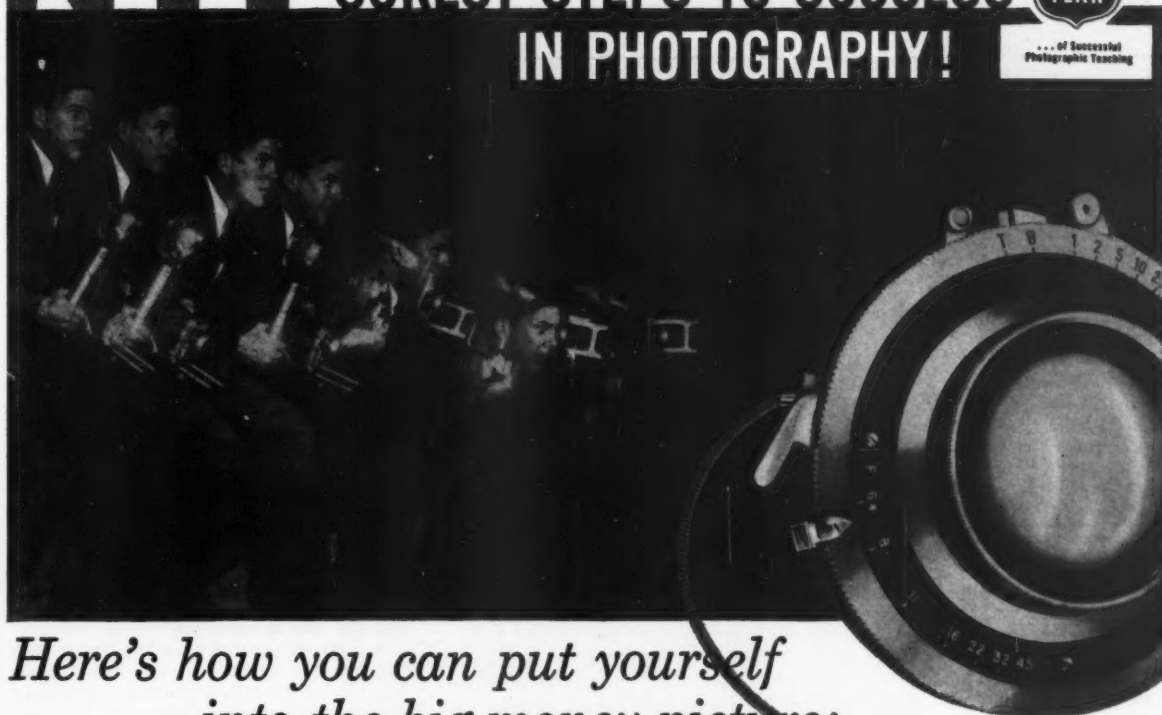
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35MM

(Continued from page 40)

to the desired f-number, the shutter makes the exposure, the mirror returns to viewing position (unless it is of the type which returns only when the film is advanced). (3) Advance the film, thus readying the camera for the next exposure.

Compared to the basic SLR this represents a very high degree of automatic response. The net result is that such a camera can be operated very rapidly; in fact, just as rapidly as you can advance the film, focus and shoot.

Unfortunately, little progress has yet been made in providing devices to maintain the automatic features of the diaphragm when an advanced SLR is used with extension tubes or bellows for macrophotography. This may be unimportant to you, but it is something a camera buyer should know.

The deluxe SLR

In this class of cameras the automatic features of the advanced SLR are carried one step further.

The diaphragm not only closes automatically, but immediately after the exposure it re-opens wide and the mirror returns to viewing position before the film is advanced.

So, by my definition the deluxe SLR has, among others, these characteristics: *Internally actuated, self-closing and self-opening diaphragm, and self-return mirror.*

There has been considerable debate among photographers as to the exact value of these fully automatic features. On the pro side it is pointed out that the close/open cycle of the diaphragm and the up/down movement of the mirror occur so rapidly that viewing vision through the lens is virtually uninterrupted and that this is a help for following the subject.

On the con side it is pointed out that after the diaphragm and mirror have functioned as they do it is still necessary to flip the film advance lever before another picture can be made. Therefore, it is said, for all but the most specialized situations this offers no real picture taking advantage over the type I call the advanced SLR.

I refuse to get involved in *that* argument. However, I think that it is important to point out that these fully automatic motions call for mechanisms which are considerably more complex and costly than those in other SLRs. Unless such a camera is very well designed and built it is likely to break down after moderate use. Therefore I limit the deluxe class to those cameras of top-notch optics and mechanics.

At the present time, just as with the advanced SLR, little has been done to provide devices that maintain the automatic diaphragm movements if you use extension tubes or a bellows for macrophotography. However, they will probably appear in time.

To qualify fully for my definition
(Continued on page 52)

If your camera...

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give you critical ground glass focusing and composing—direct, accurate, and full size.

isn't

capable of lens tilts, swings, and shifts for controlling distortion—plus bellows extension for 1:1 copying.



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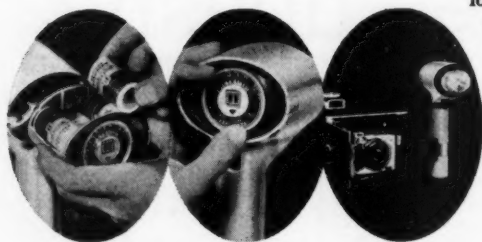
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MOVIE VIEWER

(Continued from page 25)

showing the children an old statue (see still no. 2). There's a close-up of the 16-year-old gazing dreamily at the statue, her face pale and clear, with out-of-focus candles behind her; this cuts to the reddish, rugged face of the man as, for the first time, he gazes intently at the girl; and this cuts in turn to the sharp features and bright golden hair of the younger sister as she gazes in puzzlement at the man's gazing. These close-ups by themselves convey a key moment in the movie.

Another, more rapidly cut pattern of close-ups occurs in the sequence where the 16-year-old, piqued by the man's attentions to the hotel proprietress, sets to drinking wine flched by the kitchen boy, who has designs on her (see still no. 3). This time her face is contrasted with that of her younger sister, who is trying to stop her, and with that of the kitchen boy—a visible battle between the bright, clear gold of conscience and the black hair and sullen darkness of temptation.

These are only a few examples of the skill and perception that make the photography of *Loss of Innocence* not merely beautiful but strikingly apt. This is not a great movie, but it does give great pleasure. Amid the present trend of raw and restless realism, when even the B pictures must show what they can do with zooms, dollies and shock cutting, *Loss of Innocence* offers a most refreshing experience indeed.

Around the releases

Three other movies have the light touch. John Ford's *Two Rode Together* (phot., Charles Lawton, Jr.; color) is an offbeat Western with James Stewart playing a near-villainous hero. Ford manages to convey more drama with medium shots than many directors can with huge close-ups, thanks to his sense of timing. The color is pleasant, especially in the rich-toned night scenes.

Ingmar Bergman's *Secrets of Woman* (phot., Gunnar Fischer; b/w) dates back awhile (1952), as one might guess from its conventional three-stories-in-flashback form, but the Bergman spell is ever-present. Outstanding is a hilarious sequence in a stalled elevator, where Bergman adroitly mixes camera angles, blackouts and reflections as he shows how a woman brings her pompous husband down a peg or two.

The *Girl with the Suitcase* (dir., Valerio Zurlini; photo., Tino Santoni; b/w) deals with a 16-year-old boy's love for a woman. Though too long, it has some fine sequences: the use of relentless camera movement and crisp cutting to convey the boy's adolescent anxiety when searching for the woman; and the use of casual camera work, with off-frame action and an erratic cutting rhythm (a silent comedy style), to convey the woman's happy-go-lucky attitude when shaking off a wolf.—THE END

BEHIND THE SCENES

Consumer's Union tests washing machines, etc., but how accurate are their camera tests?—New 2 1/4 x 2 1/4 made in Ireland!

How reliable are the photo equipment tests made by such organizations as Consumer's Union? We've often been asked that question. In our opinion based on our own equipment tests, the CU tests up to a few years ago were rather unreliable. A few cameras listed as "Best Buys" MODERN would not give a child even as play-toys. We know of one instance where the importer in desperation was about to unload a whole line of cameras as being almost unsalable—until CU marked it as a "Best Buy." Purchasers stripped the shelves of this model in record time, to the delight of the importer. In another instance a famous 4 x 4 twin-lens reflex tested by MODERN and found to be of exceptionally fine quality was rated unacceptable by CU.

Partly as a result of this, the importer unloaded his entire stock to a mail order concern and the manufacture of the camera was discontinued. Too late, CU ran an addendum report on a new batch of these cameras, giving it a good rating. The consumer benefited, however, since he could purchase the camera at a most advantageous price from the mail order house. The camera, incidentally, is the 4 x 4 Rolleiflex.

You can readily see why various importers and manufacturers have palpitations of the heart when CU announces a test for the next month which will involve their equipment.

Happily, CU's tests in the past year or so seem far more reliable and thorough (maybe because their results are now paralleling our test results rather closely). Sometimes, however, the compiler of the various categories ("Acceptable—very good," "Acceptable—good," "Acceptable—fair") does not show the fairmindedness one could wish. A recent issue contained what was, on the whole, a splendid rundown on 35mm single-lens reflexes under \$175. However, we noticed one camera, the Petri Penta V2, was placed in the "Acceptable—good" class even though CU's remarks about the camera and list of features indicated that in many ways it was superior to some of the "Acceptable—very good" cameras.

We still note some disparity between our lens test results and CU's, which is caused no doubt by the differences of lenses from one camera specimen to another. We have tried

consistently to warn our readers that this is so, and that every lens and camera must be tested by the prospective buyer. We wish CU would add a like warning in their tests. Consistency of lens quality is more difficult to maintain than consistency of steam irons, canned peaches or sun tan oil—although we're sure many housewives might like to dispute that!

Adieu YF

Without fanfare, Yashica is discontinuing making the YF focal-plane rangefinder camera to devote full production facilities in the Yashica-owned Nipca camera works to the Pentamatic single-lens reflex. This is a shame, we feel, since the YF with its very rugged body, superior rangefinder and good 50mm f/1.8 lens using the same thread as the Leica lenses fulfilled a definite need in the medium price bracket rangefinder camera field. If you've been thinking about getting one, better pick it up before the last models disappear from dealer's shelves.

Brewing a 2 1/4 SLR

"This week K. G. Corfield of Ballymoney, Co. Antrim (Northern Ireland), has commenced production of a new camera which may revolutionize the photographic industry," began the story in London's *Financial Times* of June 30, 1961.

And just what has K. G. Corfield, makers of the 35mm Periflex camera and now owned by the Arthur Guinness and Sons brewing interests, been up to? It's the Corfield 66, a 2 1/4 x 2 1/4



Real square Irish camera?

single-lens reflex with focal-plane shutter, interchangeable lenses and backs and a rapid-return mirror. It will also take a prism finder. Sound good? O.K., now for some details.

The four-element 95mm f/3.5 Lumax lens has a large bayonet mount, focuses as close as 4 ft. and closes down to f/22. It has clickstops. Clickstops? What, it has no automatic diaphragm? Nope, not even a preset one.

(Continued on page 46)

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Photo Products

BEHIND THE SCENES

(Continued from page 45)

The interchangeable backs wind separately from the shutter. They have no automatic film stop. A dark slide must be slipped between camera and back if you want to remove backs in mid-roll. The focal-plane shutter has speeds from 1/10 to 1/500 second. The prism? Not yet available.

In Great Britain, the camera will sell for about \$200. Add a bit of import duty and the price if imported to the U.S. would be rather steep. Still, it would be the least expensive Northern-Irish-made 2 1/4 x 2 1/4 camera on the American market.

Manual precision holds its own

The emergence of the you-press-the-button-and-the-built-in-automatic-electric-eye-exposure-meter-will-do-the-rest cameras originally cast a black pall over much of the camera industry. Predictions were made that photographers would quit the precision, manually controlled cameras for the simpler automatics faster than car drivers forsook manual shift for automatic. Well, we didn't predict it.

An analysis of West German still camera import figures compiled by the U.S. Department of Commerce for the first quarter of 1961 shows that the total number of cameras imported dropped 21% to 35,089 when compared with the first quarter of 1960. Cause for alarm? Not at all. The picture looks bright when you realize that during this same period the total value of still camera imports rose 11% to \$2,244,029. This means that the average retail selling value of each German camera has risen between \$125 and \$150, a new high.

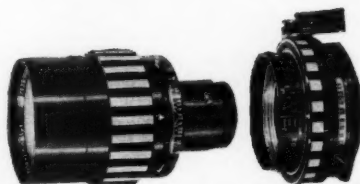
This was borne out in a quick spot check of five leading West German importers who reported marked increased sales in their higher priced cameras. And only one of the firms checked indicated that the sales increase was caused by an automatic camera. It seems that photography may yet remain an art!

Integrated SLR lens system

As has been deplored more than once in this column, the chaos in lens mounts and automatic diaphragm mechanisms for single-lens reflexes is appalling. Almost every brand has its own mount and its own automatic diaphragm mechanism. Often a change in camera bodies requires a clean sweep of your entire set of lenses. In addition, the incorporation of an automatic mechanism in each lens does raise the price of it.

A few years ago, Enna Optische of Munich came out with the universal socket. In the U.S. the system went by the name of "Sandmar." Buy just the socket, which remains on your camera, and simply interchange lens barrels. If you purchase a different reflex, keep your lens barrels and buy a new

socket. Financially, the photo fan came out well ahead. The Enna lenses tested by MODERN proved of a very high optical quality. Unfortunately, the semi-automatic diaphragm mechanism was awkward to set. Now Enna is introducing a new socket and set of lenses. This time the socket is eminently practical. It's completely automatic: just press the shutter release and the lens stops down, take your finger from the release and it opens automatically. The line-up of lens



Glorious step in right direction?

barrels which will fit the socket and produce completely automatic diaphragm operation is impressive: 24mm f/4, 28mm f/3.5, 35mm f/2.8, 50mm f/1.9, 95mm f/2.8, 135mm f/2.8, 240mm f/4.5.

Initial sockets will fit the following cameras: Edixa, Exakta, Exa, Pentacoon, Praktica.

Camera inside lens?

Before we've had a chance to test the forthcoming 50mm f/0.95 lens for the yet to be released Canon 7 range-finder camera, we have news of yet a faster Canon lens—a 186mm f/0.63. Don't wait up for this one. It's rather bulky, very expensive and made only for X-ray photography. The design, however, is truly awe-inspiring. The film sits in the middle of the lens! The image enters one end of the lens and passes through an optical system that includes a field flattener. It then reaches the other end of the lens, where a large concave mirror reflects the image back to two small central elements and thence to the film. This is something akin to designing a lens and placing the camera body in it. It's almost worth being X-rayed just to see it in operation.

Bringing 'em back?

Now that the camera that never dies—the Argus C3—has again been re-issued, this time at \$29.95 (5¢ less than it cost in 1939 when it was introduced), we wonder whether there might not be a definite market for reissues at rock bottom prices of famous, old, discontinued cameras for which the dies might still be available—something like reissues of recordings on bargain labels. Take the Argus A, with f/4.5 lens, speeds from 1/25 to 1/200 sec., and two-position focusing. It cost \$12.50 new in 1936. It certainly would be a welcome sight to serious beginners at \$9.95 today. Any other candidates for resurrection?—H.K.

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LARGE camera

BY ANDREAS FEININGER
Staff Photographer For Life Magazine

Two more picture taking problems
that were solved with the help of
the large camera.



When New York's Metropolitan Museum of Art released the news that its three most highly prized Etruscan sculptures were not genuine, *Life* magazine asked me to shoot some color pictures, one

of which is reproduced *below* in black-and-white. My task was to make the 8-ft. tall warrior look as impressive and awe-inspiring as possible.

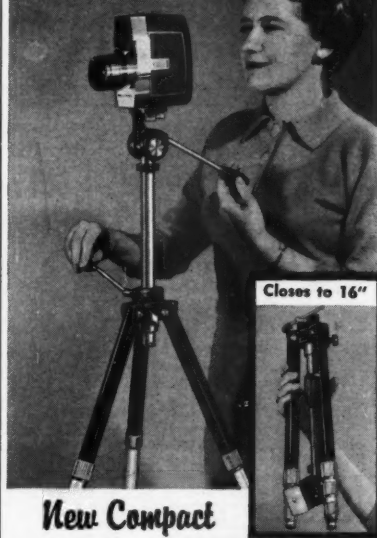
I selected a 5 x 7 Linhof Technika and Ektachrome film type B. To make the statue appear tall, I shot from a very low angle. Simultaneously, to prevent the head from looking too small and the walls of the room from appearing to collapse, I used the back adjustment of the camera to keep the film in vertical position—something which I could not have done without a swing-equipped large camera. To further increase the feeling of hugeness and ex-

(Continued on page 50)



Phony Etruscan, Metropolitan Museum.

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THE LARGE CAMERA

(Continued from page 48)

tension in depth I made the shot with a 120mm Aristostigmat wide-angle lens, which enabled me to move very close to the subject. As a result, the clenched fist appears disproportionately large and the right arm disproportionately small—a deliberately chosen effect of perspective distortion.

To extend sharpness all the way from approximately 12 in. (the fist) to the background, I used the lateral back-swing of the camera. Thus, not having to stop right down for depth of field, I could use photofloods (instead of brighter flash) with a fast enough shutter speed to "freeze" the people in the background. The wide-angle lens stressed the statue's size by making the people look small.

Shooting a radio telescope

To illustrate the article "Life on Other Worlds," *Life* magazine sent me to West Virginia to photograph the huge radio telescope at Greenbank. My job was to get a picture of the telescope at night against star trails.

When I saw the location I realized that only a double exposure would produce an acceptable picture. For good perspective, the radio telescope would have to be photographed with a lens of standard or longer focal length, whereas the sky, to include as many stars as possible, would have to be photographed with a wide-angle lens.



Radio telescope, Greenbank, W. Va.

In addition, the floodlighted telescope demanded a short exposure time and the sky a longer one. And finally, the best views of each did not coincide.

The accompanying picture was made on Tri-X film with a 4 x 5 Meridian II camera. First, with a 150mm lens, I shot six sheets of cut film of the floodlighted radio telescope, exposing each approximately 10 sec. at f/16. Then I had the lights shut off, turned my camera some 45 degrees, and using a 90mm Angulon wide-angle lens exposed the same six sheets of film again to record the tracks of the stars. I varied these exposures—from 10 to 30 min. at f/11—for different effects.

Each of these two subjects could have been shot with any kind of camera, but the photographs would have been inferior in several respects because only a large camera permitted the necessary control.—THE END



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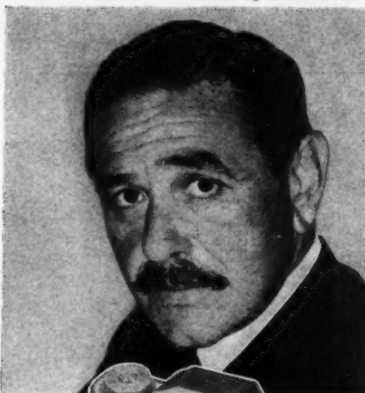
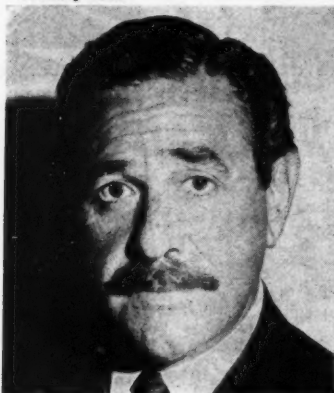
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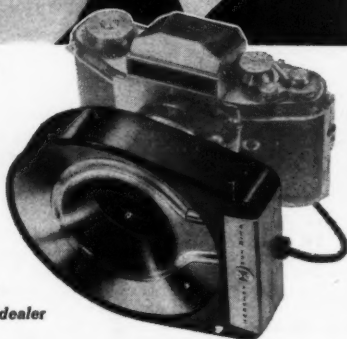
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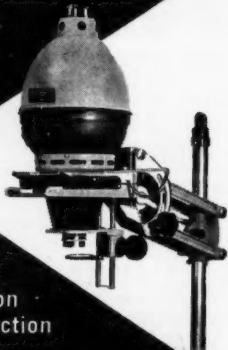
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(Continued from page 23)

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35MM

(Continued from page 42)

of deluxe I think such a camera should also have all of the following features, and there is no reason except cost why some or all could not be on an SLR:

A wide range of accessory lenses, from wide-angle to extreme tele, specially designed for the camera, several of which have the automatic diaphragm movements of the normal lens.

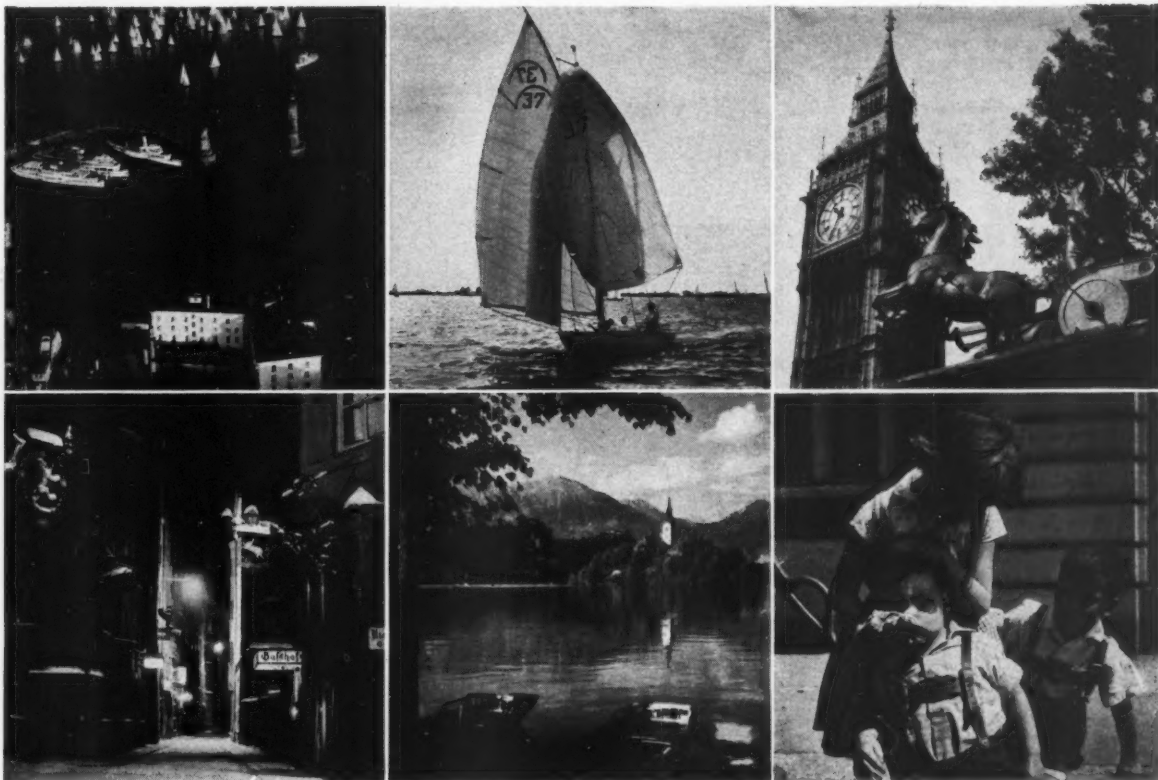
Removable pentaprism to permit use of interchangeable viewing screens, providing choice of plain ground glass, fixed prism rangefinder, etc., without need for tools or mechanical skill.

Right-angle eyepiece for the pentaprism, or an optional waist-level viewfinder and magnifier.

I am aware that not all cameras are going to fall neatly into my four groupings. Once again I want to emphasize that the fact that some camera now in existence lacks one or more of the features I have listed should not be considered a reflection on the quality or desirability of that camera. My groupings are merely descriptive, not qualitative, in nature.

However, I believe that these four rough groupings serve to separate out the important 35mm SLR design trends of the past and those new ones which should be obvious to anyone who reads the ads in MODERN.—THE END

Rollei-magic gives quality pictures automatically... *shot after shot!*



Owners of Rolleimagic consistently report . . . "I'm getting 12 perfect black and white pictures, or 16 beautiful Super Slide color transparencies, from every 120 roll without any effort." Isn't this what you should expect when you invest in an automatic camera?

The uniform picture results which Rolleimagic provides stem from the way Rollei builds this automatic camera. Every component is the finest, most precise available. The photo-cell and exposure meter, for example, are the same, proved type used on Rollei professional cameras. This is also true of the sharp-cutting Schneider lens employed. The shutter is the proved automatic type by Gauthier; and every other component bears the hallmark of renowned Rollei quality. In other words,

there are no uncertain or weak links within this camera. Thus when you shoot with Rolleimagic, each component functions with highest precision . . . assuring precise picture results, shot after shot.

Another advantage you'll like is negative size. It gives you 12 large $2\frac{1}{4}'' \times 2\frac{1}{4}''$ negatives or 16 Super Slide transparencies from 120 rolls . . . ideal sizes for contact prints, and unequalled for enlargements and for projection. And Rolleimagic provides for strobe and flash shooting, and permits taking time exposures of any duration.

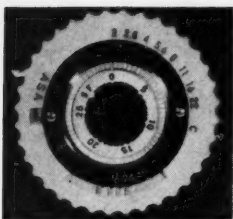
Your dealer will be glad to demonstrate the versatility and simplicity of Rolleimagic. Visit him today; or, write for a free copy of the new illustrated Rollei camera brochure.



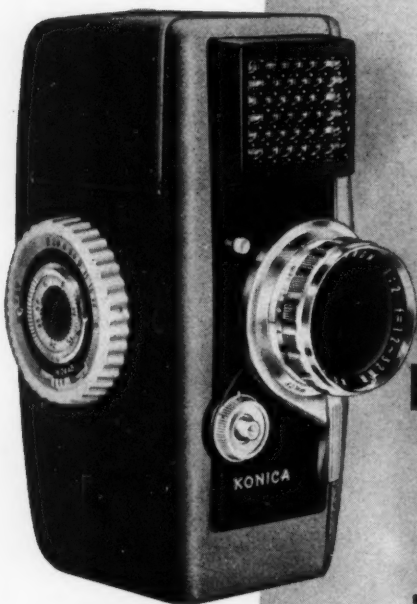
BURLEIGH BROOKS, INC.

420 Grand Avenue, Englewood, New Jersey

PONDER & BEST, INC., 841 North Cole Avenue, Hollywood 38, California



CONTROL CENTER: large, single dial centers the simple controls vital to fine movie-making.



ELECTRIC DRIVE: penlite batteries run the motor, roll after roll after roll! No interrupted scenes, no troublesome winding.

ONLY WITH KONICA ZOOM II

**FULL RANGE
ZOOM from
27" CLOSE
... in Focus!**

Konica Zoom II, unlike ordinary zoom cameras, lets you use its *full* zoom range at *any* distance as close as 27 inches from your subject! No need to "back off" when shooting full telephoto, you zoom in from up close for remarkable effects never before possible! And even at 27", you *focus* thru the lens (no tape measures or guesstimates!). To go a step closer, Konica's wide converter lets you *focus* and shoot from as close as *two inches!*

Looking through the lens you see that the film is always properly exposed (meter needle always centered when you're

"set" to shoot). Your dealer will gladly show you how professional fades and dissolves, and impressive titling, are possible with your Konica, because of its special frame counter that permits accurate, measured rewind. Compact, lightweight, balanced . . . simplicity itself to operate! With V-Hexanon f2, 12 to 32mm range, the list price of \$229.95* plus case buys you a lifetime investment in professional home movies. See for yourself at your Konica dealer.

*THE LIST PRICE SHOWN IS ESTABLISHED BY THE MANUFACTURER, BUT MAY VARY HIGHER OR LOWER, DEPENDING ON THE SALES PRACTICES IN YOUR AREA. CONTACT YOUR DEALER FOR THE EXACT PRICE IN YOUR AREA.

KONICA CAMERA COMPANY, 76 WEST CHELTEN AVE., PHILADELPHIA 44, PA.
IN CANADA: MCQUEEN SALES CO., 1843 W. 4 AVE., VANCOUVER 9, B.C. IN VENEZUELA: SEIJIRO YAZAWA, APARTADO 3179, CARACAS
MFG. BY KONISHIROKU PHOTO IND. CO., LTD., TOKYO—FOUNDED 1876

...because "THE LENS ALONE IS WORTH THE PRICE"

TOO HOT TO HANDLE

I am interested in the Rolleiflex 3.5F, which can be had either with the Carl Zeiss Planar or the Schneider Xenotar. Is the Planar worth the additional \$20 asked for it?—M. G. Murphy, Meriden, Conn.

We feel that both the Schneider Xenotar and Zeiss Planar are truly outstanding lenses. The only reason for the price discrepancy is the difference in labor costs, shipping, etc. We see no reason to spend the extra \$20 for the Planar.

What is your opinion of the Wittnauer Cine-Twin movie camera and projector combination?—C. W. Plowright, Ludlow, Pa.

The Wittnauer Cine-Twin which is rather bulky lacks many of the camera features of modern machines—integral electric eye and multiple fps speeds, for example. It's also rather inconvenient if you want to use the camera as a projector when unexposed film remains in the machine.

Would the Leica M3 with 50mm f/1.5 Summarit and Habricht 8 x 30 binoculars be a workable combination for telephoto effects?—Cpl. J. N. Clarkis, N.S., Canada.

We don't think you'd be happy with the results. The Summarit has too large a front element to allow a good fit with the Habricht binoculars. In addition, we would not consider the Habricht binoculars to be of first-rate quality. We think you'd be better off with an inexpensive tele. Incidentally, binoculars are generally recommended only for single-lens reflexes. How would you focus with them on the M3?

Can you compare the Canon Zoom 8 with the Konica Model II Zoom 8mm movie camera?—D. L. Powers, Canton, N.Y.

Starting from the top, the Canon has a spring-driven, 6-ft. film run, while the Konica has an electric motor which can run off the entire 25 ft. of film at one burst. The Konica has speeds of 16, 24, 32, and also 48 with accessory booster. The Canon offers 8, 12, 16, 24, 32, 48 and 64 fps. The beamsplitter for the Konica through-the-lens focusing and viewing system is behind the diaphragm. Thus, the image gets somewhat dimmer

when the lens is stopped down. Since the Canon beamsplitter is ahead of the diaphragm, image brightness remains the same throughout. The Konica has ground-glass focusing and the Canon a built-in split-image rangefinder. The Konica is much more compact than the Canon, with most of the 8 to 32mm f/2 Hexanon Zoom lens recessed in the body. The f/1.4 Canon offers a slightly greater focal-length range—10 to 40. Our tests indicated that both lenses are extremely good, with the Hexanon slightly superior at maximum aperture, to be expected when comparing an f/1.4 with an f/2.

I'm considering the purchase of the 100mm f/3.5 Canon for my Leica M2. Which accessory viewfinder should I use for accurate, parallax-free images?—R. Klettke, Fond du Lac, Wis.

You can use either the Leitz Imairect—which has settings for 90 and 135mm—or the Canon finder. Neither represents a perfect solution. If you use the Leitz finder, parallax correction will be perfect but image framing will be slightly off. If you use the Canon finder, you'll frame the image perfectly but may have some slight problem with parallax because there's a slight difference in finder placement between the Leica M2 and the Canon.

Can you rate the 105mm f/4.5 Accura Anastigmat in short mount for extension bellows?—D. M. McDonald, Halifax, N.S., Canada.

While we have never run a formal "Modern Test" on the Accura Anastigmat, personal use by various members of MODERN's staff indicates that it is extremely good value for the money provided the lens is stopped down to about f/6.3 or f/8.

I would like to purchase a tele to be used with my Heiland Pentax lens for wild life photography. Is the 4X Tamron auxiliary lens adequate or should I buy the 200mm f/3.5 Komura?—A. Jaffee, Ann Arbor, Mich.

In our opinion, results with the 4X Tamron auxiliary would be inferior to those with the 200mm f/3.5 Komura.

Which is best for the Nikon F single-

lens reflex camera—the 58mm f/1.4 Nikkor or the 50mm f/2 Nikkor?—M. Sendin, Madrid, Spain.

Our tests in the past have indicated that the 58mm f/1.4 Nikkor is superior to the 50mm f/2 Nikkor. However, Nikon tells us that the present 50mm f/2 lenses are extremely fine. We have requested samples for testing.

I own a Nikon S-2 with a 50mm f/2 Nikkor lens, 35mm f/3.5 Nikkor and vari-focal viewfinder. Is it reasonable to expect that I can trade this equipment for a used Nikon F with a further \$30 to \$50?—J. D. Slocum, Birmingham, Mich. No, it would not be reasonable. The trade-in value of your Nikon S-2 with 50mm f/2 Nikkor is about \$60. The S-2, while an excellent camera, is a discontinued model, which makes your position a bit weak. The 35mm f/3.5 Nikkor lens will bring about \$30 or \$35 on a trade-in, although it too is a good unit. A new Nikon F with 50mm f/2 Auto-Nikkor sells for \$329. The camera hasn't been in circulation long enough for many used models to be available. Also, a used model is likely to be in at least good condition—and would certainly cost more than the \$90 for your equipment plus another \$50.

I've tried two different 50mm f/2.8 lenses with my Retina Reflex S with the same result—fuzziness at the edges, particularly at f/4 or greater. Pictures were made on a tripod using a cable release. Moreover, when I use the Retina Reflex with a Bauscope monocular there's definite vignetting. Can you recommend a good reflex camera?—B. Eck, M. D., Ladue, Mo.

We're surprised that you have such troubles with the Retina Reflex S. Our tests of the Retina 50mm f/2.8 lenses indicate that overall quality is, in general, quite high. Before you decide to sell the camera, we suggest you take it to the store where it was purchased and have them send it to Eastman Kodak Repair Division, Rochester, N. Y. for a checkup. It's possible that there is a slight defect in the camera's lens mount which could cause the lenses to be improperly seated. By the way, we doubt that you'll be able to cure the Bauscope vignetting problem, since practically all monoculars will cause this to happen. Only a tele or long-focus lens specifically designed for photographic use can produce corner-to-corner sharpness.

I have a supply of outdated 16mm film. Since I use 8mm equipment I'd like to know if there's any way to convert the film so that I can shoot it.—E. St. John, Elmont, L. I., N. Y.

First, we don't recommend that you use outdated film unless the subject matter is of no great importance. Second, we feel there's a definite danger in re-sprocketing 16 to 8mm use (there are twice as many sprockets on double 8mm film as there are on 16mm film)—since this is a job requiring a high degree of precision and hardly the thing to try on your kitchen table. Even the most carefully converted film can jam.—THE END

THE ROCKY ROAD TO THE TRUTH ABOUT FLASH

YOU SHOULD BE ABLE TO FIND THE GUIDE NUMBER, FLASH DURATION, RECYCLING TIME AND COVERAGE OF ANY ELECTRONIC FLASH UNIT, BUT CAN YOU?—BY CHARLES HELLMAN

THERE'S EVERY GOOD REASON why the popularity of electronic flash as a light source is still growing. Today's units are almost ideal photographic light sources. The short duration of the flash practically guarantees sharp pictures without blur due to motion of subject or camera. You can use small apertures in most picture situations, further improving sharpness. The short flash duration is much easier on subjects than the intense heat from floodlights. The color balance approximates daylight so that daylight type color film may be used directly or with slight filtering.

The latest compact amateur portable units are particularly attractive with their new tiny flash heads, built-in rechargeable nickel-cadmium batteries with claimed "life" expectancies.

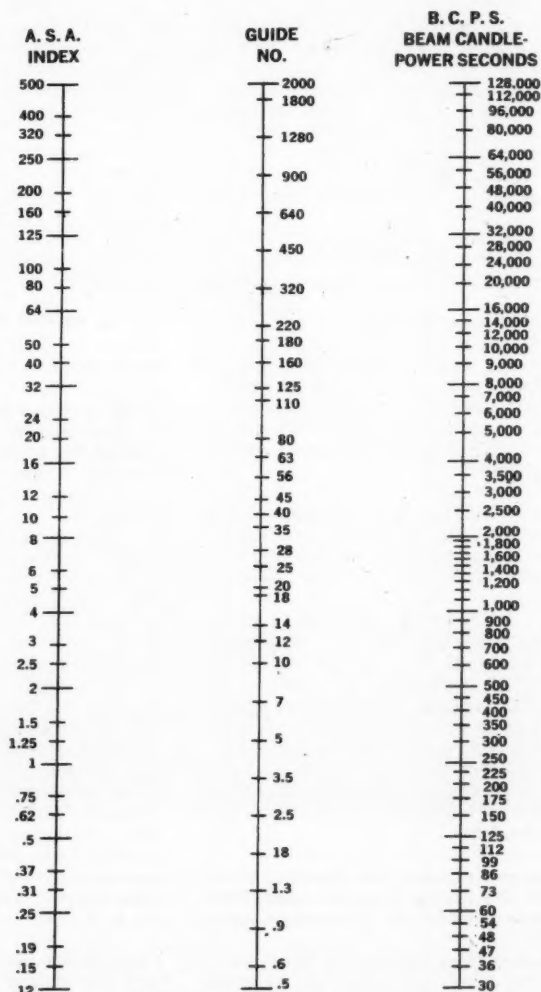
Unfortunately, the technical improvements in electronic flash have not been matched by an accompanying increase in information on their abilities and use. Claims and counter-claims and rivalry in guide numbers have all but benumbed the poor user or would-be purchaser. Some of the questions puzzling photographers are: What do the numerous ratings used to indicate the output of electronic flash mean—watt-seconds, BCPS, ECPS, guide numbers? Do exposures by electronic flash require heavy overdevelopment? What is reciprocity failure and how serious is it? Are filters necessary with electronic flash with color films even when manufacturers claim they are not? What are the advantages and disadvantages of nickel-cadmium cell batteries? And just how effective are those tiny reflectors of unconventional design? Why are there no standards for electronic flash to help clarify claims?

Let's start out by examining what originally was used as a standard—watt-seconds—and see why it wasn't practical. Early units were built and used largely by electronic technicians. It was natural and easy to rate the units in terms of electrical measurements. Since all the energy supplied to the flashtube is stored in the capacitor, the measure of this energy in watt-seconds

became one of the first output ratings. (The physicists call the same unit the joule.) Watt-seconds stored in a capacitor can easily be calculated from the formula:

$$\text{Watt-seconds} = \frac{1}{2}CE^2$$

(where C is the capacitance of the capacitor in microfarads and E is the operating voltage across the capacitor expressed in kilovolts). Thus a modern small portable unit may have a capacitor of 320 mf (microfarads) and operate at 500 volts ($\frac{1}{2}$ kilovolt). The electrical energy stored is 40 watt-seconds. A studio unit may have a capacitor of 100 mf and operate at 3 kilovolts. This works out to 1800 watt-seconds. Note how the watt-seconds increase very rapidly with the voltage. Therefore, in large units, high voltages are necessary. Studio units operate in the kilovolt range.



IDEAL SOLUTION TO GUIDE NUMBER MESS: By lining a straight-edge ruler across the ASA index of your film and the BCPS of your flash unit, you can intersect proper guide number. If ASA standard is adopted, such nomographs (this is Ascor's) may accompany each unit.

The watt-second rating is important. It does indicate maximum possible output. However, actual light output depends on the efficiency of the flashtube and reflector as well as the amount of energy stored. Thus the watt-second output in itself cannot represent the photographic effectiveness of the unit. There's been much competition in the designing of tubes and reflectors, so units having the same watt-second ratings may vary widely in actual light output. However, you should be suspicious of the truthfulness of photographic ratings of units that are too far out of line compared to others with the same watt-second ratings.

Reliable guide numbers are the most useful ratings of a flash unit's output. These ratings can be used directly by the photographer to find the aperture setting for his camera. Establishing guide numbers for Kodachrome film is the most reliable means of rating flash units since the speed of the film and the processing are held to close tolerances. Guide numbers for black-and-white films derived from Kodachrome guide numbers are also reliable. Here's how you get them:

GN (Guide Number) for film of index $I =$

$$\text{Kodachrome GN} \times \sqrt{I} \div 10$$

Thus if the GN for Kodachrome for a portable unit is 25, the GN for Daylight HS Ektachrome E.I. 160 is

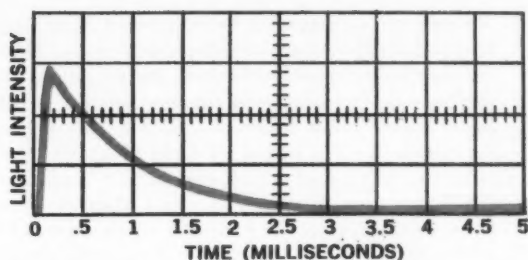
$$25 \times \sqrt{160 \div 10} = 25 \times 4 = 100$$

Be sure when calculating the GN's for black-and-white films that you use the new ASA ratings. These ratings will give you guide numbers which will produce negatives or transparencies of the proper density. Former ratings included a generous safety factor, resulting, in most cases, in over-dense negatives. You don't need to do all this math each time you use a new film, however. Here's a concise table to help shorten the work load. Find the index for your new film and simply multiply the Kodachrome guide number of your unit by the corresponding Multiplying Factor. This is your new film's guide number.

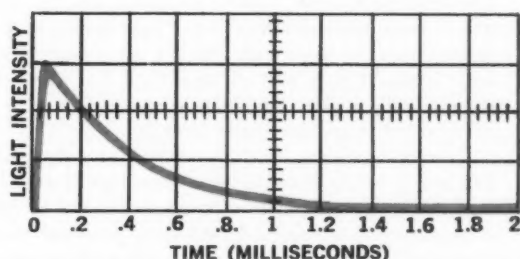
E.I.	Multiplying Factor
25	1.6
32	1.8
50	2.2
100	3.2
160	4.0
200	4.5
400	6.3

We are progressing however, to some measure of standardization so that we can calculate the guide number of any film from the technical specifications of any unit. Here's how it's developing.

The brightness of the flashtube itself is measured in candlepower. However, total illumination from a flashtube is also dependent on the duration of the flash as well as the brightness. The duration is generally much shorter than the actual shutter speed used. At first electronic flash manufacturers stressed the short exposures that could be obtained to stop motion and to help produce sharp pictures of rapidly moving subjects. Then reciprocity failure reared its ugly head. You should be able to double the brightness and maintain proper ex-



HOW DO YOU MEASURE DURATION? Oscilloscope shows total flash duration for 500-volt unit is 2.5 ms or 1/400 sec. Under proposed ASA standards, useful duration would be measured between the points at which it reaches and returns to 1/3 full intensity. Thus it's 1 ms or 1/1000 sec.



CAN YOU SHORTEN IT? By connecting two flash-tubes to the same unit as above, the discharge time is nearly halved. Time axis is now .2 ms per box; flash duration is half that of one tube.

posure by halving the duration. However, at extremely short flash durations this relationship breaks down. There isn't time enough for the image to register properly. Either a longer duration flash or a higher brightness is needed.

Once this effect was recognized, electronic flash makers reversed field and stressed the long exposure times of their units as minimizing reciprocity failure. This double interpretation of the duration of flash was possible because of the peculiar shape of the graph of light output against time of the flashtube (see illustration above). The flashtube does not put out a light of constant intensity. When a unit is flashed, the light reaches its maximum intensity almost immediately and then gradually decreases to zero. Thus a typical portable unit may be said to have a flash duration of 1/500 sec., relatively long, if the time includes the full sloping tail in the graph. This is misleading, as almost all the light output is represented in the area of the graph before the curve slopes to the axis.

The proposed ASA standard (which we'll discuss later) sets the time interval "from the instant the flash reaches one third of its peak intensity to the instant it decays to the same value." This proposal is quite valid and will provide a useful yardstick. Most portable units on the market will probably test out at 1/1000 to 1/2000 sec. when measured according to the proposed standard.

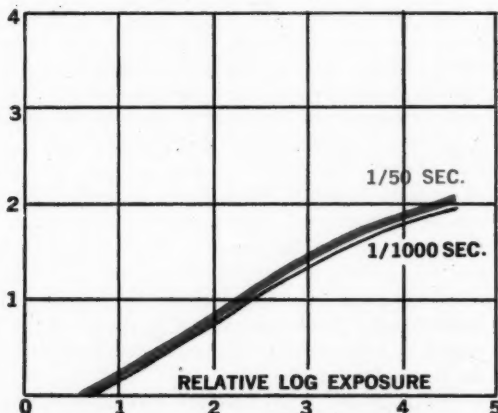
The photographic effectiveness of a lamp at a given

distance may be expressed by the product of the brightness and the duration in candlepower-seconds. When a reflector is placed behind the lamp, the brightness along the beam is increased, and the new product is called Beam Candlepower Seconds (BCPS). This is useful for comparing the output of units along the central beam axis but it does not tell what is happening all over the picture area. By designing a unit which produces a hot-spot in the center of a picture, a manufacturer can obtain high BCPS at the expense of even illumination. However, an average portable electronic flash unit of 50 watt-seconds usually has about 1500 BCPS output.

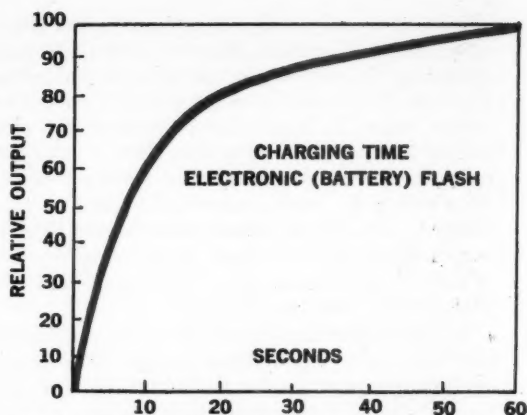
To arrive at one single number evaluating the light output of a flash unit, the candlepower-seconds at different angles must be measured and then a weighted average must be found. This is expressed as Effective Candlepower Seconds. ECPS penalizes hotspotting units and is more representative of the light distribution. It suffers from the basic fault that it is an average over a wide angle. It does not tell what light the film in the camera will receive. And film response is not to an average but to point-by-point intensity.

Conflicting claims for different electronic flash units can largely be attributed to the obvious lack of standardized measurements. After a number of years of effort a committee has finally agreed on a proposal for an American Standard for measuring the performance of electronic flash equipment. "The chances of this document being approved, substantially as it is, as an American Standard are very good, but until such approval has been secured we must be careful not to refer to it as a Standard" states J. A. Van den Broek, chairman of the committee, to whom we are indebted for our copy of the current draft proposal.

In view of the importance of this proposed standard, we will present details of most concern to the photographer, and discuss their photographic implications.



DO FLASH FILMS NEED OVERDEVELOPMENT? Curves for both 1/1000-sec. and 1/50-sec. flash on Ilford HP3 film were shifted at toe so they'd overlap. Only at high densities is there a slight separation of the curves. For practical purposes, you ignore this separation. Modern high-speed flash doesn't need extra development.



WHAT'S THE RIGHT RECYCLING TIME? Rechargeable battery units increase in relative output swiftly at beginning of charge. Charge rate tapers off as they reach capacity. Proposed standard would set 70% of charge as proper recycling minimum. Recycling time here would be 12 sec. even though full charge takes whole minute.

Quantity of light or light output is to be measured in Beam Candlepower Seconds (BCPS) using an electrical meter that integrates light intensity and time. But there is an important qualification: measurements must be made at 84.1% of peak voltage. Thus the light output rating will be obtained from an electronic unit after a practical delay time between flashes rather than a rating obtained after a long wait (which may be a minute or more for some units) to reach peak voltage.

Coverage of light is the spread of light emitted, or the included angle of the beam of light produced within defined limits of quantity and orientation." The proposed standard recognizes the great importance of evenness of illumination of the flash head over the subject area. In fact, as we will see later, the "merit figure" for an electronic unit gives equal weight to the coverage of light as well as the quantity of light.

Coverage of light is measured with the same integrating light meter used for the measurement of quality of light. The lamp head is rotated and measurements made at 5-degree intervals on both sides of the center line (top right, opposite page). "The designated angle of coverage shall be the included angle between points where the strength of the light is 50% of that measured on the axis of the lamp head."

This definition gives you a good idea of the light fall-off over the subject field with any unit. For instance, with a 50-degree angle of coverage, the intensity of the light at 25 degrees from the center will be 1/2 that at the center. This is a full stop difference in exposure—an appreciable drop, particularly when it is added to the decrease in corner illumination of the lens itself. With the "normal" focal-length lens angle of 50 degrees, such a unit will cause an appreciable falling off of illumination. If you need a more even light coverage, try a unit with a greater coverage angle, say 60

degrees. From it you will get more even illumination over 50 degrees. This "angle of coverage" definition will be invaluable if you use wide-angle lenses and want to know if a unit will cover your viewing field without running an actual test.

Gimmicks in reflector design which produce hot-spotting are largely outlawed by a rule that "no two readings five degrees apart will vary more than 25%."

The increasing use of lamp heads with non-circular reflectors is recognized, as the coverage in the horizontal and vertical planes may be appreciably different. Thus a rectangular reflector may have its coverage specified in two angles. "Units having an angle of coverage in the vertical plane differing from that in the horizontal plane by more than 10% shall have separate designations for the angle of coverage in the two planes, for example, as follows:

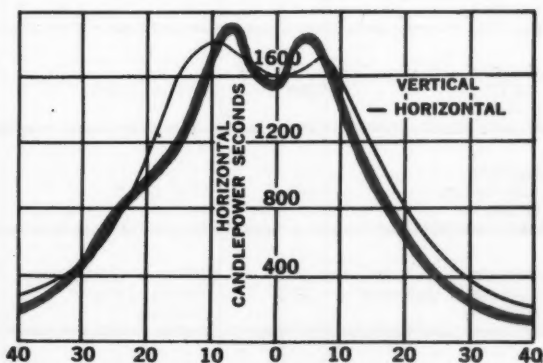
2500BCPS/60° — 45°

Here we see the shape of things to come if the proposed standard is widely used. Light output will be given as the top of the slant line and angular coverage at the bottom of the slant line.

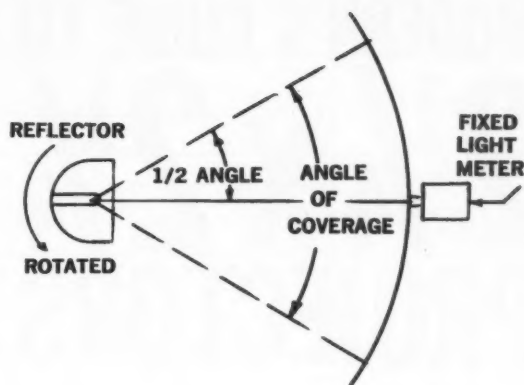
BCPS ratings cannot be used directly to set the aperture in picture taking. An appendix to the proposed standard recognizes this problem and "It is suggested that manufacturers who choose to designate the performance of their equipment in accordance with this standard furnish in the literature that accompanies the equipment a conversion factor which may enable the user . . . to convert BCPS to guide numbers."

Examine the sample nomograph for converting BCPS to guide numbers for various ASA indexes with one unit (page 56). If every electronic flash maker rates his unit as suggested by the ASA group, we can have easily understood and quite truthful nomographs for every unit. Let's pray for the day.

For the meantime, there are several other important misconceptions and theories that should be cleaned up.



DOES REFLECTOR EFFICIENCY VARY? Even a circular sealed beam reflector varies in efficiency, both horizontally and vertically. Note disparity between graph lines. Proposed ASA standard would measure coverage from half energy points (here 1000 CPS). So this reflector, according to the graph, would measure total of about 40°.



CAN FLASH COVERAGE BE MEASURED ACCURATELY? By placing a light meter directly in front of a reflector you can measure the brightness head-on. When the reflector is rotated, brightness decreases. At the angle where light falls off to 1/2 that measured head-on, the half-angle of the effective flash coverage is measured.

Some writers, and even instruction books for electronic flash, recommend increased development times, up to 50% for exposures made with black-and-white film. Overdevelopment poses a problem to most users who have exposures made by ordinary light as well as by flash on the same roll. It causes several undesirable effects, such as increased graininess and probable loss of print quality. But modern amateur portable units no longer require overdevelopment of negatives.

The first electronic flash units marketed operated on high voltages. Consequently they had short flash durations, in the range of 1/5000 to 1/10000 sec. Reciprocity failure and inflation of guide numbers led to underexposure. Considerable overdevelopment, currently called "pushing," was resorted to in order to overcome these difficulties. Several high-energy developers were marketed to push shadow detail. There was some justification for overdevelopment with these early electronic flash units. Today, despite the continued publication of advice to the contrary, there is generally no need for overdevelopment. Current amateur units have flash durations that approximate 1/1000 sec., not far from the highest speed available on many cameras. At such durations, the need for extended development is negligible, and most popular films show practically no reciprocity failure.

Continue to use your favorite film developer with normal times. Normal contrast and density should result if reliable guide numbers are used. If low density occurs, reduce guide numbers. (Dividing the guide number by 1.4 will effectively double the exposure.)

Because of the widespread disagreement on the effect of reciprocity failure of films, we have obtained the following latest available information from several major film manufacturers:

Eastman Kodak: "The average total duration of the flash from a portable unit is (Continued on page 100)

MODERN'S GUIDE TO 2 1/4 x 2 1/4 PROJECTORS

THE 2 1/4 TRANSPARENCY has one big advantage over the 35mm when it comes to projecting them both on a screen. To fill the width of a 40 x 40-in. screen with 35mm, you need a magnification of about 30X. But with 2 1/4, you can fill the same screen with a magnification of only about 20X. Assuming the same proficiency of exposure and focusing, this means that your 2 1/4 transparencies are going to look appreciably crisper and less grainy than the 35's, even to people who are sitting close to the screen.

Until recently, however, the 2 1/4 color enthusiast had practically no way of taking advantage of this advantage. Only a handful of 2 1/4 x 2 1/4 projectors existed, and none of them was automatic. Worse still, even if he had a 2 1/4 projector, he had to mount the transparencies himself. The only convenient way of getting his color onto the screen was to have it mounted in superslide form—but even if he planned his shooting to allow for the masked edges, he was obviously sacrificing much of the advantage of the larger format.

At last the manufacturers are coming to the 2 1/4 man's rescue. They began by modifying 2 x 2 projectors so as to accept 2 1/4, either with or without accessory adapters; and some models that work automatically with the smaller format require manual operation with 2 1/4 x 2 1/4. However, automatic 2 1/4 projection is here: four models have built-in automatic changers, and another offers it as an accessory. Although the number of 2 1/4 projectors on the market does not yet rival the number of 2 x 2 models, the 15 listed at right do offer a pretty reasonable choice, from the simple and inexpensive up to the advanced and expensive. MODERN hasn't yet had a chance of testing any of them, but we hope to report on them soon.

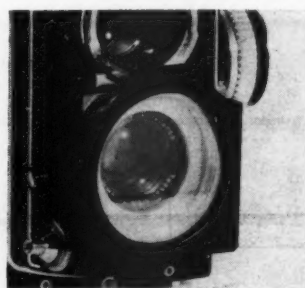
Since the best projector in the world is no help unless your color is mounted, we're glad to report that the mount situation has brightened considerably—not only will processors now return your 2 1/4 x 2 1/4 color transparencies in cardboard mounts, but there's also a pretty wide range of more durable mounts for you to choose from. (For a full discussion of this subject see "Modern Color," page 28.) So cheer up, all you 2 1/4 color enthusiasts—the time has come when it's both possible and convenient for you to put your full-size transparencies on the screen.—W.H.J.

NAME, COUNTRY OF ORIGIN	WATTS	LENS
Anscomatic U.S.A.	500	5-in. f/3.5; acc. lens, 7-in.
Bausch & Lomb Balomatic 755 U.S.A.	500	7-in. f/3.5; acc. lens, 5-in.
Brumberger Fleetwood 1406 U.S.A.	500	5-in. f/3.5; acc. lenses, 3-, 4-, 7-, 9-in.
Brumberger Fleetwood 1406 W/140 U.S.A.	500	5-in. f/3.5; acc. lenses, 4-, 7-, 9-in.
Brumberger Riviera 1422 W/140 U.S.A.	300	5-in. f/3.5
Bell & Howell Headliner 708 Duo U.S.A.	300	5-in. f/4
Bell & Howell Headliner 709 Duo U.S.A.	500	5-in. f/4
Ferrania Fer-Color 6-6 Italy	100	85mm f/2.8 (57mm f/2.8 for 35mm)
Leitz Prado 66 Germany	500, or 750 w/ heat filter	150mm f/2.8; acc. lenses, see price column
Linhof 500 Germany	500	200mm f/4
Polaroid #610 U.S.A.	500	6 1/2-in. f/5.6
Realist 620 Deluxe U.S.A.	300	5-in. f/3.5
Rolleiflex Automatic Universal Germany	500	150mm f/2.8; acc. lenses, 110mm, 250mm
Rolleiflex Projector Adapter Germany	150	Uses finder lens of Rolleiflex
Viewlex Model V-53 U.S.A.	300	5 or 6 1/2-in. f/3.5 optional

AUTOMATION		NOTES	PRICE
35	2 1/4		
Built-in	No	Manual showing of 2 3/4 x 2 3/4, 2 x 2 and single-frame stereo, by means of 3 slots atop projector; automation for 2 x 2 uses TDC type tray	\$119.50 w/case
Built-in	Built-in	Tray holds 40 2 1/4 x 2 1/4 slides, or 2 x 2 slides with adapters; slides may be cardboard or glass intermixed; timer cycle 4 to 30 sec.; manual changer operation; remote control built in; editing feature	\$179.50 w/case; remote control cord, \$4.95; 2 x 2 adapters, 20 for \$1.25
Accessory	Accessory	Manual carriers for 2 1/4, 35mm, Polaroid and single-frame stereo, \$3.95 each; automatic changer for 2 1/4 x 2 1/4, with timer and remote control, \$29.95; Airequipt automatic changer for 2 x 2 slides, \$14.95	\$79.50; case, \$14.95
Accessory	Built-in	Manual carriers for 2 1/4 x 2 1/4, 2 x 2 and single-frame stereo, \$3.95 each; Airequipt automatic changer for 2 x 2 slides, \$14.95; 2 1/4 x 2 1/4 automatic changer includes remote control and timer	\$99.50; case, \$14.95
Accessory	Built-in	Manual carriers for 2 3/4 x 2 3/4, Polaroid 46L, 2 x 2, single-frame stereo, \$3.95 each; Airequipt automatic changer for 2 x 2 slides, \$14.95	\$79.95 w/automatic changer; \$59.50 w/manual; case, \$14.95
Accessory	No	Selectron Semimatic semi-automatic changer for 2 x 2 slides, \$12.50; uses TDC type trays	\$59.95; case, \$5.95
Accessory	No	Same as 708 Duo above	\$89.95 w/case
No	No	Projects on 12 x 12-in. built-in screen, or on wall; folds into case 14 x 13 x 4 in.	\$179.50 w/case, 2 lenses; \$151.50 w/case, 85mm lens; \$149.50 w/case, 57mm lens
Accessory	No	Manual changer for 2 x 2 slides, \$7.50; automatic changer for 2 x 2 slides, \$21 (needs new front assembly, \$72.60 w/90mm f/2.5 lens)	\$201; \$240 w/150mm f/2.5; \$294 w/175 f/2.5; \$216 w/200mm f/4
No	No	Takes 2 1/4 x 2 3/4-in. 70mm Cine Rollex slides in special 85 x 85mm mounts; adapter for carrier to take 2 1/4 sq. slides in 2 3/4 sq. mounts, \$5.95 per pair; conversion kit for 35mm, w/condensers, 100mm f/2.8 lens, slide carrier, \$72.60; kit w/150mm f/2.8 lens, \$87.50	\$290; case, \$39.50
No	No	For 2 1/4 x 2 1/4 Polaroid Type 46 slides in special Polaroid #630 Slide Mount	\$109.75 w/case
No	No	Adapters for Polaroid slides, single-frame stereo, \$4.95; 35mm adapter w/conversion lens, \$4.95	\$44.50
Built-in	Built-in	Has two channels, one for 35mm tray, other for 2 1/4 slides; both sizes can be shown alternately with both trays in place at same time	\$240; case, \$25
No	No	Uses finder lens of Rolleiflex camera models having removable hood	\$49.50
Accessory	No	Automatic changer for 2 x 2 slides, price on request	\$67.95; case, \$9.90

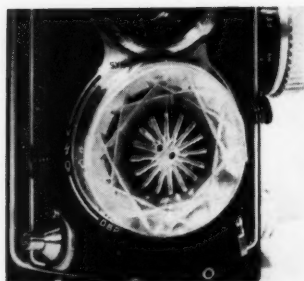
CUT LOOSE WITH YOUR TWIN-LENS REFLEX

EVERYONE KNOWS that the twin-lens reflex is a no-nonsense camera, ideal for the straight, standard, middle-distance shot. But don't sell it short. This doesn't mean that twin-lens reflexes can't be used for experimental purposes as well. Several months ago, MODERN assigned color expert Norman Rothschild to try some experiments and devise some techniques for making abstracts with the twin-lens reflex. A few of his results appear on the following pages. With the exception of the picture *bottom page 64*, these photographs were made by placing a transparent object in front of the camera's lens: a circular diffraction grating, *opp.*; a piece of clear 35mm film with microscopic lines engraved on it *bottom page 65*; a five-sided prism, *top page 65*; and a plastic button, *top page 64*. Rothschild's method, one which you will find essential in your own twin-lens experiments, is fairly standard. Since most of the gadgets which he used covered only the taking lens, he first attached them to the viewing lens to see the effect he was getting, then moved them to the taking lens before making the exposure. Most of the gadgets fitted a standard Series VI filter adapter ring: for the others, such as the ruled screen, Rothschild devised his own method of attaching the gadget to the camera, in this case mounting the screen in a cutout cardboard holder, which he slipped into an Eastman Kodak Gelatin Filter Holder over the lens. The devices which Rothschild used in making these photographs came from a number of sources: the least expensive, the embossed plastic button, was purchased for 29 cents at a five-and-dime store; the most expensive, the five-faceted prism (actually a Proskar Trick lens originally intended for special effects work in movies), cost \$60 and is available from Aetna Optix, Inc., 350 W. 31st St., New York 1, N.Y. Edmund Scientific Co., 101 E. Gloucester Pk., Barrington, N.J., source of both the circular diffraction grating and the engraved 35mm film, has a free catalogue which lists a great number of optical devices which can be used for experimental work. Since the subject matter of most of the photographs consisted of lights, Rothschild relied on experience in estimating exposure; we suggest that you bracket exposures when you launch your own experiments, using Rothschild's tried and tested f/stops and shutter speeds as "normal." For details on the tools and techniques which produced these pictures, see the captions.—P.C.

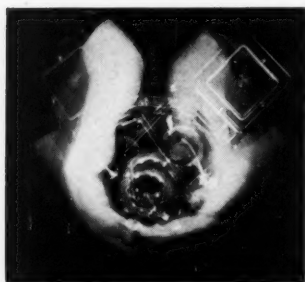


DIFFRACTION GRATING was inserted in filter holder, placed first over viewing lens for choosing precise angle, then over taking lens in making this late afternoon picture of the New Jersey shore. Since the Rolleiflex's f/3.5 lens had to be used wide open (when stopped down the iris diaphragm cut off the grating pattern), Rothschild also used both 2X and 10X neutral density filters in the adapter ring to cut down the light reaching the film. He calculated exposure from an incident reading with a Norwood Director meter, opening up two stops to compensate for backlight. Anscochrome Daylight Type, f/3.5 and 1/500 sec. This Circular Transmission Diffraction grating can be obtained from Edmund Scientific Co. for 75¢.



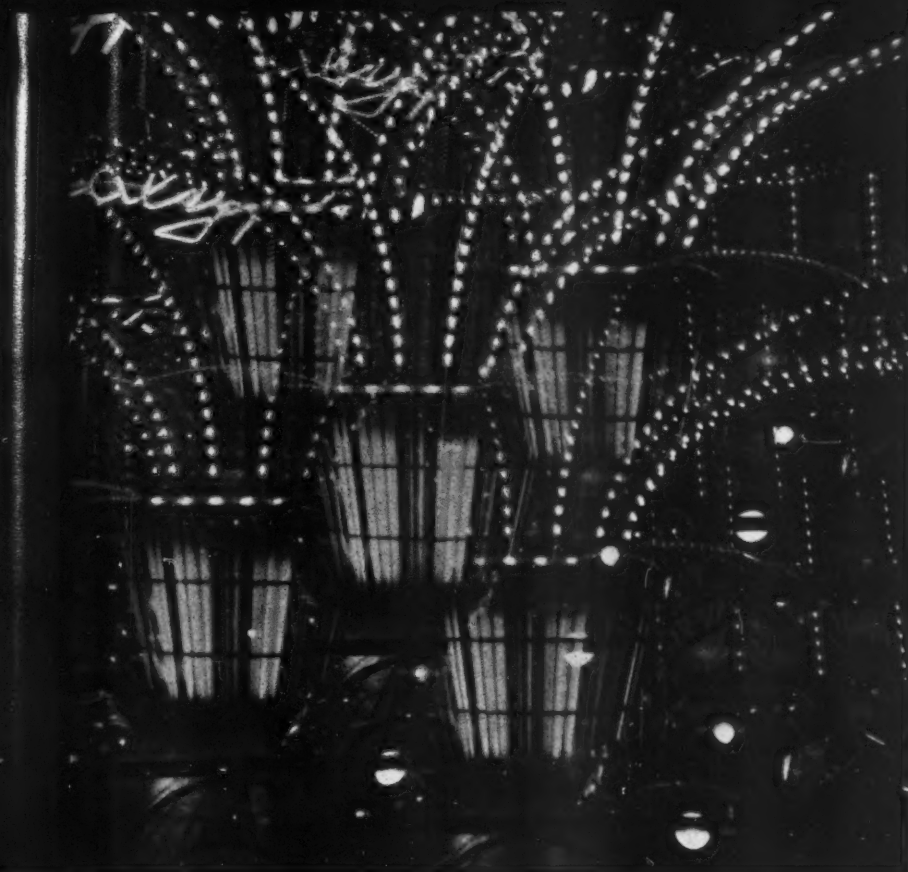


PLASTIC BUTTON plus red and green Wratten Rheinberg filters taped to lens produced kaleidoscopic rendition of light bulb. The design embossed on the button broke up the light rays, the circle of dots surrounding the sharp image of the bulb itself are from the thread holes. Rothschild exposed Super Anscochrome Tungsten at $f/3.5$ and $1/8$ sec., calculating exposure from a reading with a Norwood Director meter, and opening up two stops to take into account the filter factor. It is not necessary to use these specific filters, which are designed for use in photomicrography and are relatively expensive. The same effect would have been produced by color gels, available from your local photographic dealer.

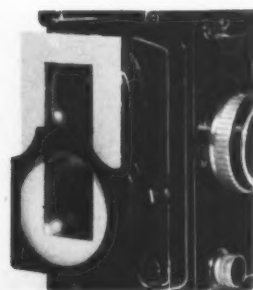


ROTATING CAMERA transformed New York's Broadway into unrecognizable pattern of moving lights. Since the viewing image with twin-lens reflexes is not blacked out during exposure as with single-lens reflexes, Rothschild was able to observe approximate final effect on the ground glass while actually shooting. As there is no way to measure the intensity of light exactly with most meters we suggest bracketing exposures until you gain sufficient experience to guess. Exposure, actually, need not be as critical as for continuous-tone scene since the viewer has no way of knowing what the scene really looked like. $F/4$ and $1/4$ sec. with Daylight Anscochrome film rated normally in a Rolleicord Va camera.





FIVE-FACETED PRISM multiplied light pattern of Palisades Park, N. J., ride to produce five overlapping images. This device was originally intended for making trick movies, but can be used with any $2\frac{1}{4}$ or 35mm reflex. Rothschild taped the prism onto a Series V bayonet adapter ring, which he first mounted on the viewing lens and then shifted to the taking lens. This particular prism, the Proskar, is available through Aetna-Optix Corp.; others can be obtained from any optical supply house, range in price from about \$16 to \$60. No exposure increase is needed even though path of light reaching optical system is split into a number of separate images. Rolleiflex T, f/3.5 and 1/30 sec. on Super Anscochrome Tungsten.



RULED SCREEN, when slipped into home-made adapter cut out of cardboard and affixed to taking lens, also covers viewing lens, need not be moved for viewing and shooting. Colored lights make best subject for shooting with this gadget. When used for an ordinary, continuous-tone scene, results are unspectacular. Here, Rothschild photographed the neon lights on a ferris wheel at Palisades Park, N. J., exposing Super Anscochrome Tungsten Type film at f/3.5 and 1/15 sec. in a Rolleiflex T. There are no problems in calculating exposure, since screen does not reduce the amount of light reaching the lens. These screens, and various other devices suitable for experimental photography, are available from Edmund Scientific Co.

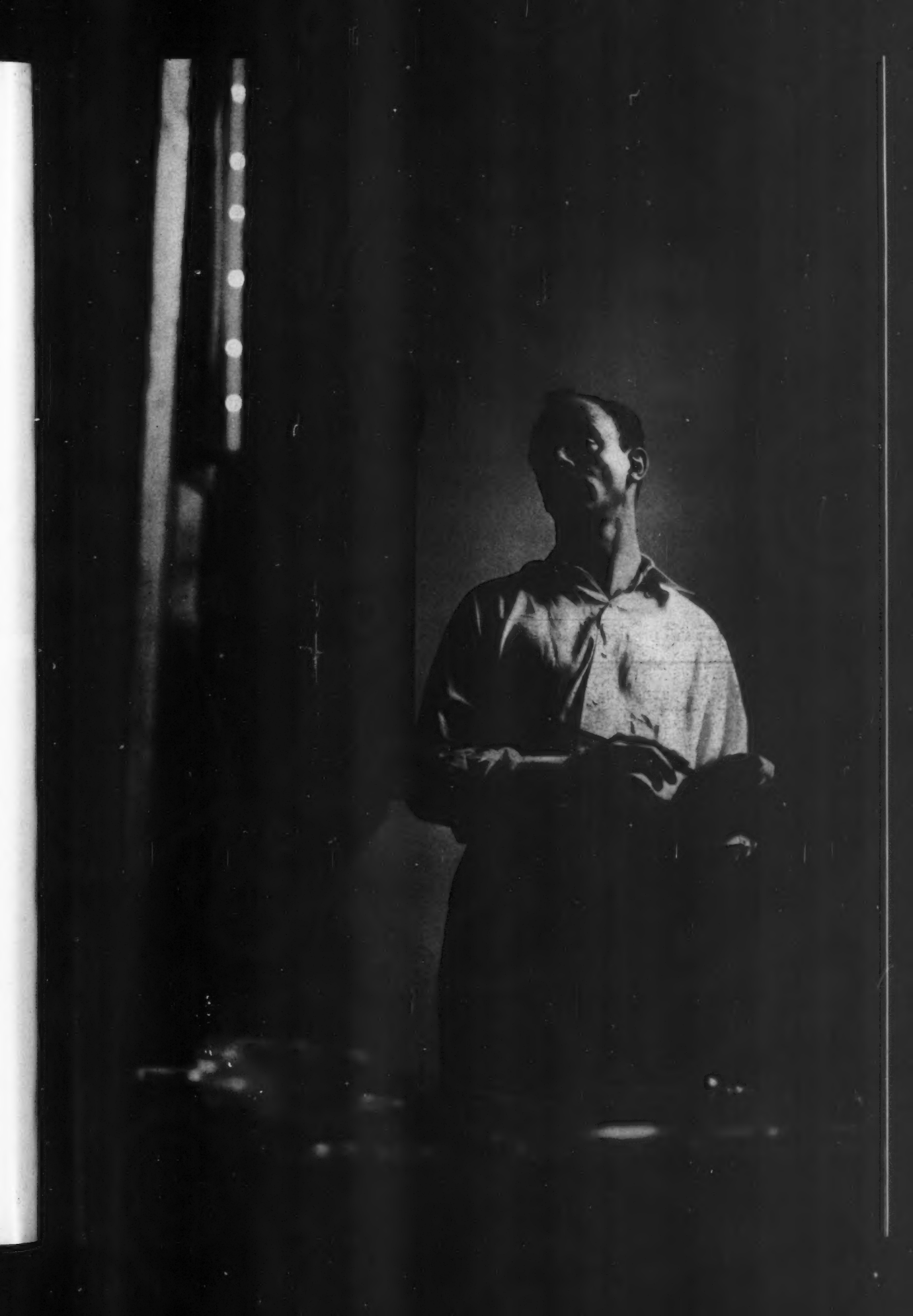
CAMERA ANGLE IS THE KEY TO TWIN-LENS PORTRAITS



IF A PHOTOGRAPHER had to pick a single camera for portraiture, he would probably select a twin-lens reflex. Why? First, the normal, waist-level viewing position is ideal for seated subjects (pages 68 and 69); second, the photographer can raise or lower the camera to shoot from a higher (left) or lower (opposite) angle without moving from his upright position; third, fast and silent operation. George Moffett took all of these photographs with a Rolleiflex camera on Tri-X film. His sole light source in each situation was diffused daylight from a window, or (page 69) from a skylight. Though these portraits seem casual, unplanned, each of them has been carefully posed and the props that also appear—furniture, paintings, and other objects—have been consciously selected and arranged. Before Moffett actually begins to photograph, he talks with his subject as long as time permits. While he

◁ Theodoros Stamos. Rolleiflex camera, Tri-X film, 1/60 second and f/5.6.

Willard Cummings. Rolleiflex camera, Tri-X ▷ film, 1/30 second and f/3.5.



talks, he searches for clues to the man's personality, and looks about for objects or locations which can be used in the picture. When he is satisfied with background and props, he composes the picture in his mind, then moves furniture, pictures, or other objects to create the frame he feels is most suitable. "Then," says Moffett, "I place the subject in this milieu, and ask him to sit, stand, or do something appropriate to his occupation or background. At that point, I start taking pictures. More often than not the whole session is given to photographing the subject in this prearranged environment. By concentrating on one particular situation, exploring its possibilities to the full, and allowing room for the unexpected to happen, I find that more satisfactory pictures result than if I move the subject about. If I try to tackle too many locations and situations, I find it becomes difficult to control the composition." Moffett used a tripod in making these photographs, which freed him to concentrate on gesture and expression once composition was set.—P.C.



Top: Bessie Breuer. Rolleiflex, Tri-X, 1/60, f/5.6.

Rt.: Jacques Lipchitz. Rolleiflex, Tri-X, 1/30, f/5.6.

Opp.: Raphael Soyer. Rolleiflex, Tri-X, 1/60, f/5.6.



PETER KEETMAN

PRESENTS STARTLING 2¼ COMPOSITIONS THROUGH DISCIPLINED 2¼ TECHNIQUES

COMPARE THE PHOTOGRAPHS on these six pages with the color pages 64 through 66. Unusual 2¼ techniques produced each group; yet they could not be more dissimilar. Rothschild's color was made by placing optical devices in front of the taking lens; Keetman's black-and-white is the result of straight, classic craftsmanship. The experimental aspect of his work is confined to his way of seeing.

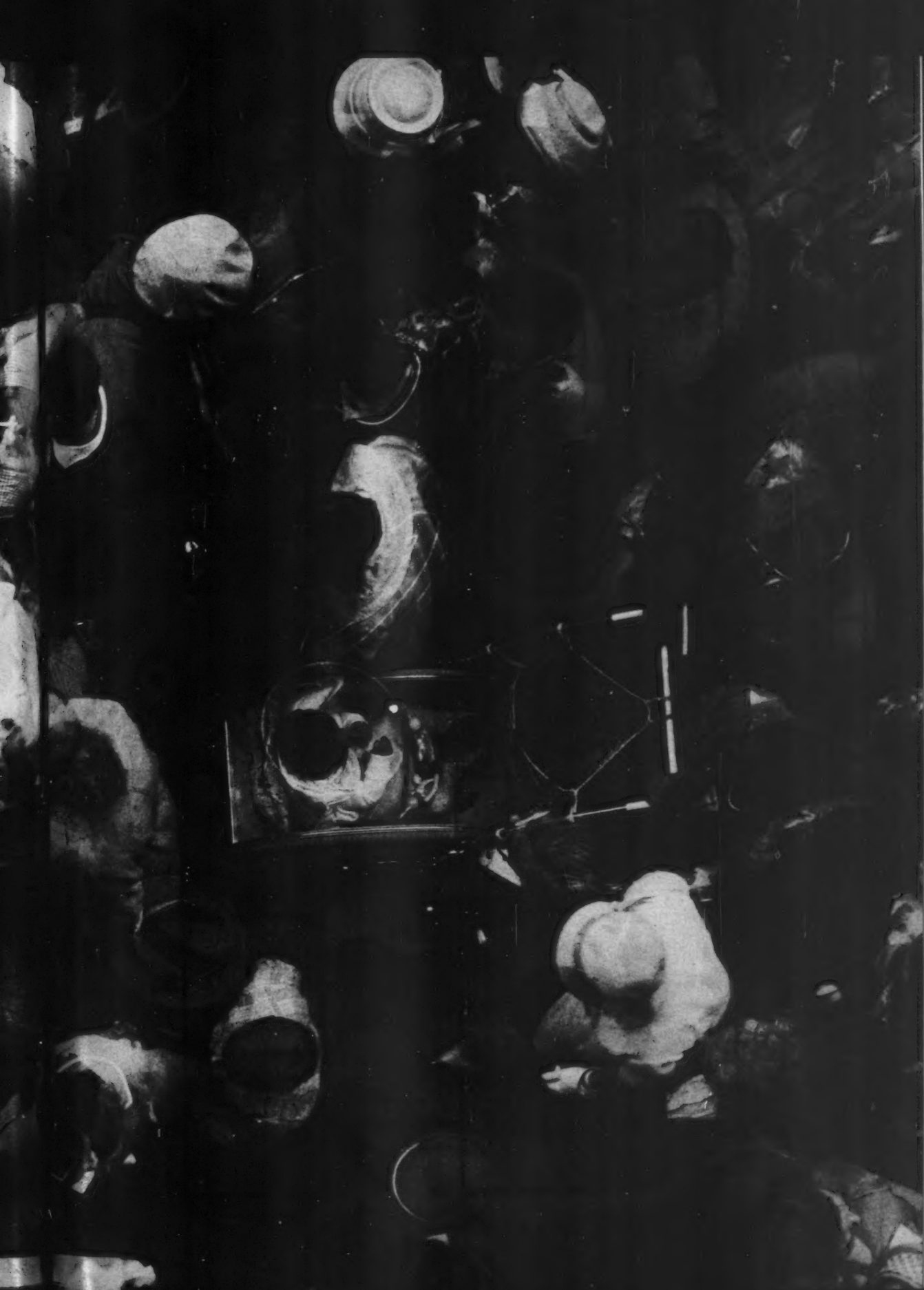
Keetman, a 45-year-old German freelance, was introduced to photography as a child, for his father was an avid amateur. After deciding to become a professional photographer, Keetman attended the Bavarian State Institute for Photography in Munich from 1935 through 1937, was apprenticed to a well-known professional for two years. During the war he served as a combat photographer until he was wounded in 1944.

Recuperation was a slow process, and during his year in a hospital Keetman continued to photograph. There he was free to indulge his interest in purely creative, non-commercial work. In 1947 he returned to school for his masters; in 1949 he and a number of *avant garde* photographers founded the group Fotoforum; since 1952 he has been freelancing, doing industrial and commercial as well as experimental photography.

For specifics on Keetman's approach and techniques, see the captions.—P.C.

MULTIPLE IMAGES of pedestrians on a busy street were made by three separate exposures: one at 1/250 at f/4, two at 1/250 and f/11. Multiple exposures are possible with all Rolleiflexes manufactured since 1953, except the Rolleiflex T, simply by moving the release ring at the base of the crank in the direction indicated by the arrow, then moving the crank through one backward revolution until it stops. Keetman had Rolleiflex clamped to edge of balcony when he made this photograph, could not see ground glass when making exposures. Before shooting he checked area covered by lens, planned placement of figures simply by watching the pavement as they passed by. Ilford FP3 film, straight print.







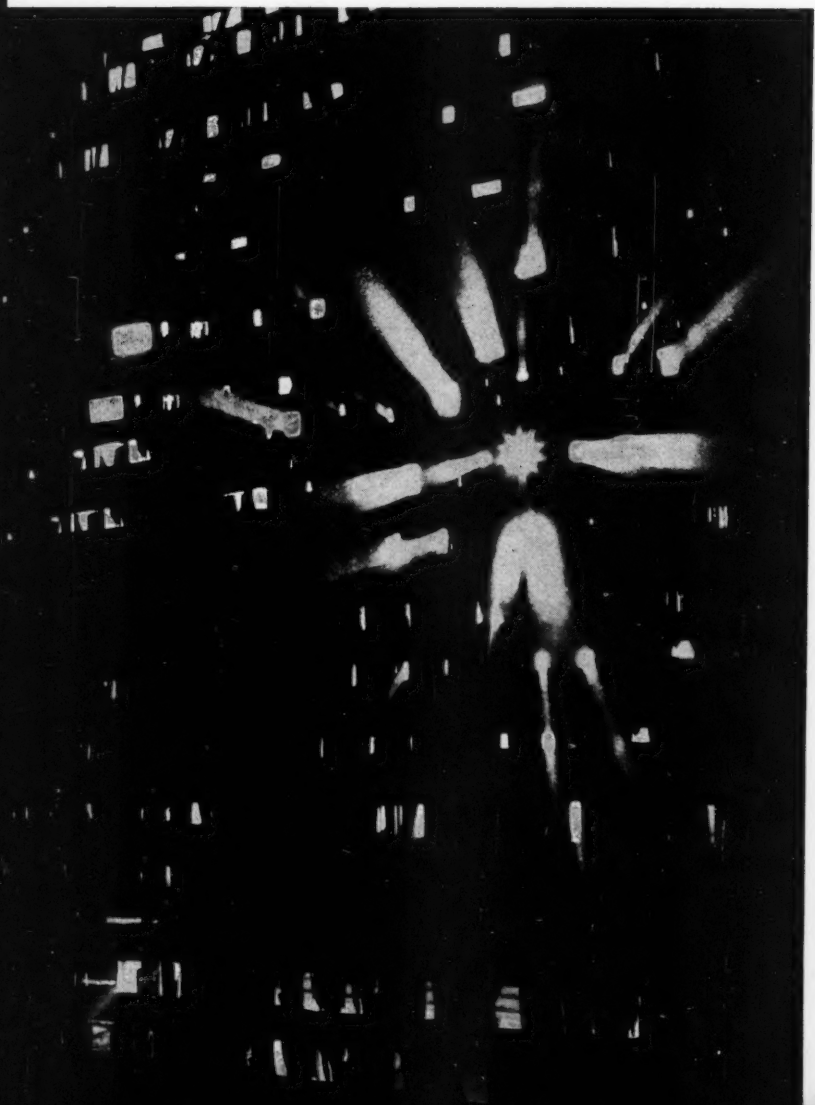


◁ ◁ **EXTREME CLOSE-UP** is of oil drops on a window; crosses which appear in each drop are reflections of the window frame located behind the pane. Keetman made this photograph with a 4 x 5 Linhof camera, Schneider Symmar 210mm f/5.6 lens. He owns two other view cameras: a 9 x 12cm Peco and a 10 x 15cm Linhof, which he uses only for Ektachrome. While Keetman does most of his black-and-white shooting with his 2¼ x 2¼ cameras, he does employ the view cameras when swings or tilts are needed, or when making extreme close-ups. Here Keetman exposed for 8 sec. with lens set at f/32, but actual working aperture was considerably less. The formula which Keetman used to determine working aperture will be helpful to you in your own close-up work: multiply the lens-to-film distance by the f-number, and divide this product by the focal length of the lens. Initial light reading made with a Weston Master II meter.

◁ **OPEN SHUTTER** allowed Keetman to track car's passage down a country road at dusk by recording headlights only. Keetman estimated the length of time it would take car to travel down the road, and used a Norwood Director incident light meter to determine the f-number he would need to expose normally for the snow-covered landscape. He opened the shutter as soon as headlights were visible, closed it before car drove out of view. Hasselblad camera, 250mm f/5.6 Sonnar lens, Ilford FP3 film.

TWO VANTAGE POINTS were used in making this double exposure of the sun pouring through the wall of an old woodshed. Keetman first focused on holes in wood, made exposure, changed camera position, focused and shot again. His exposure was correct for the landscape outside, and of course burned out the direct rays of the sun and "underexposed" the inside of the shed. Enlargement was straight, with no dodging or burning in. Each exposure was at 1/60 second and f/8, in Rolleiflex camera on Ilford FP3 film.

LONG LENS enabled Keetman to close in on a solitary swan, capture early morning stretch toward the sun. Keetman was photographing a large flock of 50 or 60 birds that winter on the Chiemsee, a river running through Breitbrunn, Germany, where he lives. After he had taken a number of overall shots of the group, one bird separated itself from its fellows, Keetman rapidly switched from a 150mm to a 250mm lens, and shot at 1/250 sec. and f/11-f/16 on Ilford FP3 film. This exposure setting indicates relatively high illumination typical of hazy weather. Since haze reflects much light back into shadows, decreasing lighting contrast, Keetman took overall reading with a Weston Master II meter, stopped down one f-number from exposure indicated. Hasselblad 500C, 250mm f/5.6 Sonnar.



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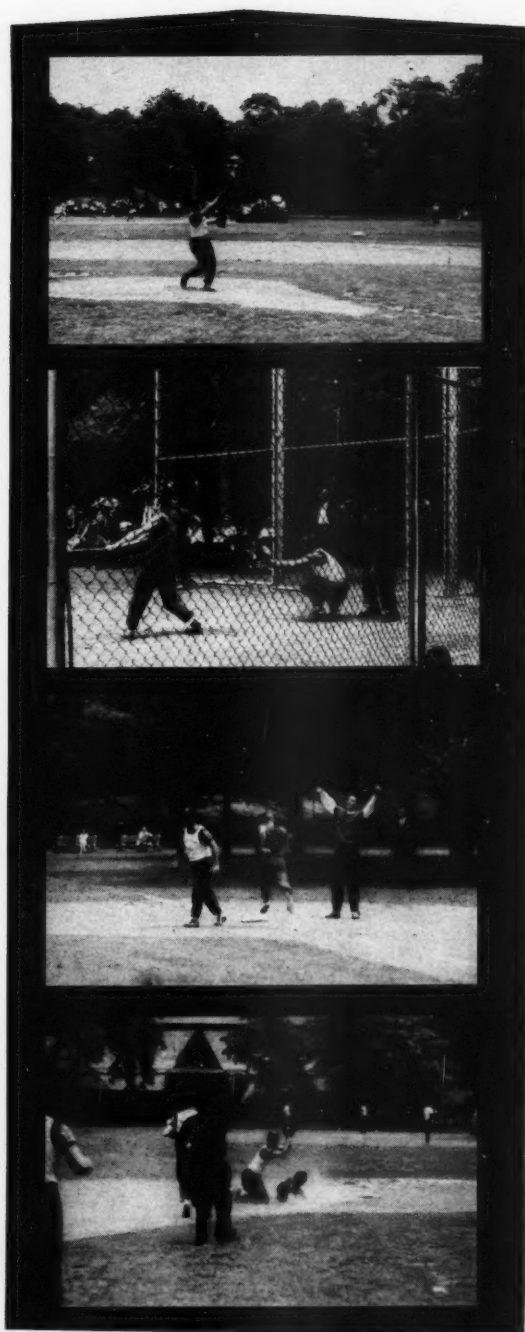
3 WAYS TO EFFECTIVE ZOOMS

THAT FIRST ROLL of movie film you shot with a zoom lens may make you wonder whether the investment was worth it. You may find that monotony sets in as one swooping scene follows another.

It's all a matter of knowing when, where and how to zoom. The illustrations *at right* show three specific zoom lens techniques—straight cutting, straight zooming, and panning with a zoom. Each has its place in your movie making technique.

Straight cuts: The zoom lens is used to shoot a sequence of long shot, medium shot and close-up. Each shot has a change of angle, framing, and camera-to-subject distance. The infinite variety of focal lengths between the widest and narrowest angle of the zoom makes it possible for you to frame each shot perfectly. With single focal-length lenses there are times when you can't move around to get the exact composition you want at a baseball game, for example. The sequence *at right* was photographed from behind home plate. We used the zoom to emphasize the action by varying framing and cutting quickly from one shot to the next. We made a wide-angle shot of the pitcher to show the field and established the scene. Next, we swung around, moved the zoom lever to the normal (13mm) position, and filmed the batter as he swung at the ball. When he connected, we just about had time to go to tele and swing around to first base. A final cut (still at tele) to second base caught the batter sliding into the bag and the umpire calling him safe. Total screen time adds up to about 15 sec., but this type of cutting tells a complete story and has sufficient shot variety and pace to keep the audience interested. It wouldn't be quite as easy with separate turret-mounted wide-angle, normal and tele lenses, since going from one to the other would take too much time.

Straight zooming: The zoom goes from long shot to medium shot to close-up without interruption or change of angle. It's used to emphasize an action that takes place in a restricted area. There are two features of the zoom shot of the children swinging that heighten its interest. First, notice the *(Continued on page 106)*



STRAIGHT CUT: Surprisingly enough, a series consisting of long shot, medium shot and close-up is one of the most effective zoom lens sequences. All cuts, above, were made from the same spot on field, but camera direction and focal length were varied to maintain interest. Frame each shot tightly, to include only important subject matter.



STRAIGHT ZOOM: Using trees, swing uprights at the sides of scene changes straight zoom from mere format-tightening to shot that has effect of a dolly. Narrowing down from overall shot of several people to emphasis on two, then one, also helps to make a shot more interesting. Straight zoom can be made smoother by increasing 8 fps over normal speed.



PANNING PLUS ZOOM: Straight zoom to top of construction work would lack detail of interesting surroundings. Panning from right to left shows new, modern building, old structure (second from top, left), and finally zooms into work on new building. Pistol grip, if you can't use a tripod, steadies camera, improves overall quality of shot.

INSIDE MOVIE PROJECTORS

MODERN'S TECHNICAL CONSULTANT BENNETT SHERMAN LOOKS AT 8 AND 16MM PROJECTORS AND TELLS YOU HOW AND WHY THEY TICK.

IT'S AMAZING that a movie projector works at all. Here's a machine that takes a tiny frame and enlarges it to a screen image big enough to be comfortably viewed by 20, 30 or more people. To do a job like that, motor, gears, sprocket drive, pulldown claw, shutter, optical system, and a battery of switches must be coordinated into a smoothly functioning machine.

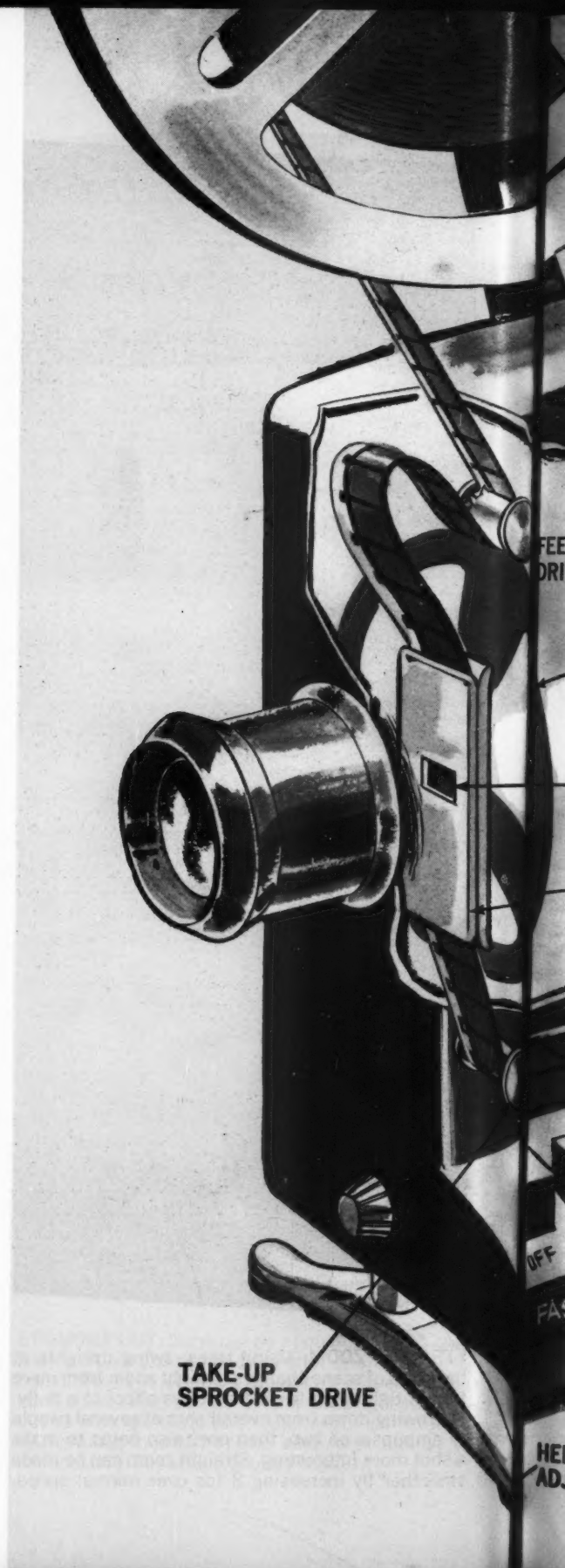
In the early days of amateur movie making, the sturdier looking projectors were usually the best. But today industrial designers have added high styling in every price bracket. No matter what you spend, you get more for your money in looks, at least. You can even buy projectors for under \$50—unheard-of years ago.

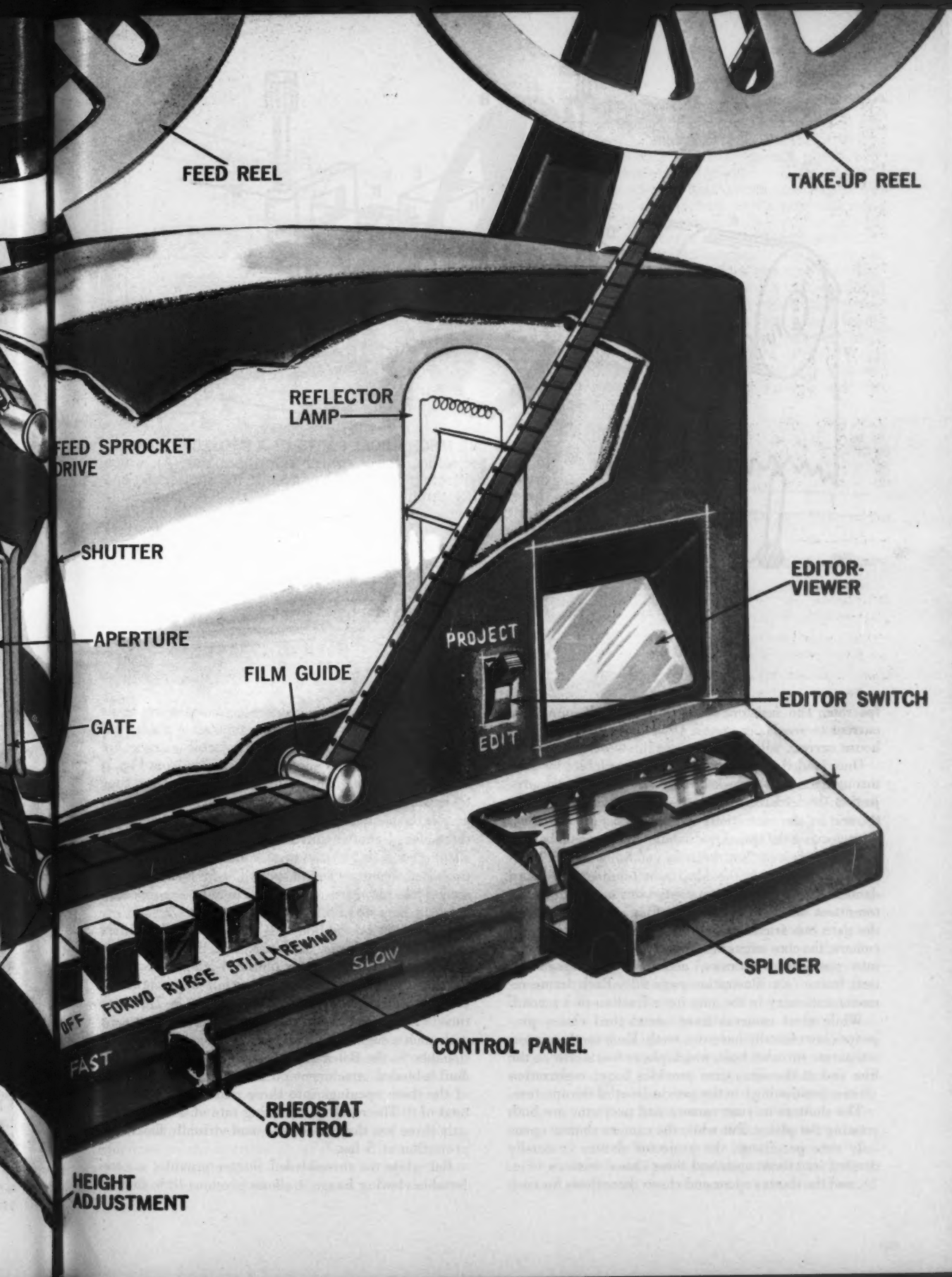
To make the best choice, however, you'll have to find out what's inside the machine. Knowing how an 8 or 16mm projector works will give you the real clues to why one machine throws a sharper image, keeps the image steadier or shows less flicker than another.

First let's examine your projector's mechanical system. All the power to drive the various moving parts comes from an electric motor fed by regular house current. The motor is geared to the sprocket drives, shutter, pulldown claw, reel arms and blower (Fig. 1, page 80). The speed that the film moves is governed either by a rheostat device or a system of resistors.

In a rheostat-controlled machine (Fig. 1) projection speed can be varied from about 12 to 28 fps. While a rheostat does have some limited use in changing screen movement for special effects, its real function is to make up for fluctuations in house current caused by the use of other appliances, etc. By adjusting the control, you can feed electricity to keep the frame rate constant.

In one- or two-speed projectors, resistors control the





FEED REEL

TAKE-UP REEL

REFLECTOR
LAMP

FEED SPROCKET
DRIVE

SHUTTER

EDITOR-
VIEWER

APERTURE

FILM GUIDE

PROJECT
EDIT

EDITOR SWITCH

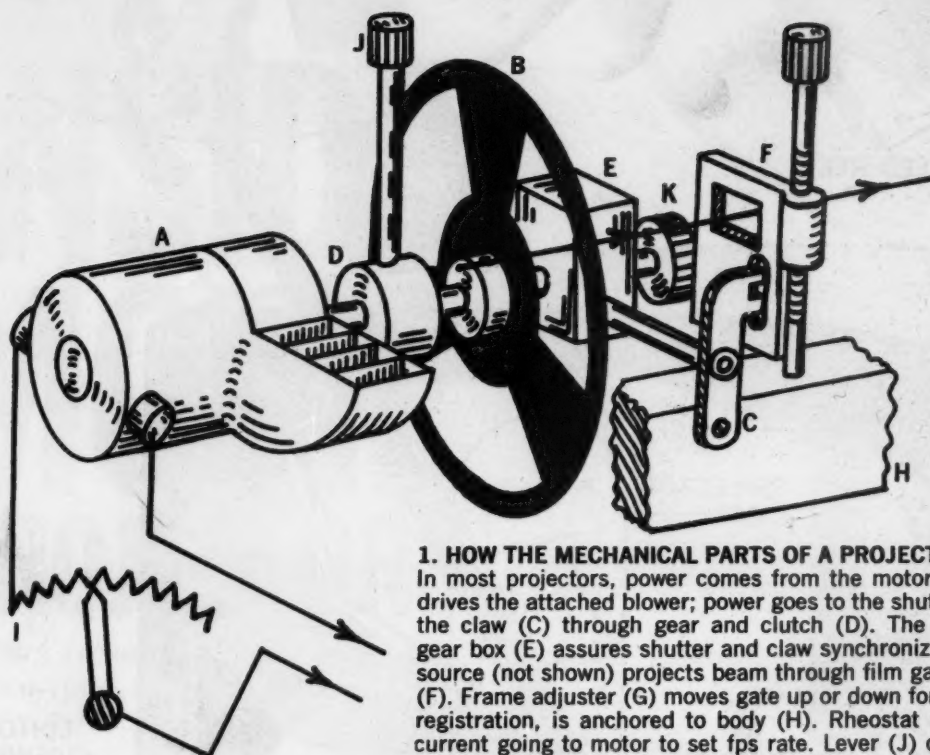
GATE

SPLICER

CONTROL PANEL

RHEOSTAT
CONTROL

HEIGHT
ADJUSTMENT



1. HOW THE MECHANICAL PARTS OF A PROJECTOR WORK: In most projectors, power comes from the motor (A), which drives the attached blower; power goes to the shutter (B) and the claw (C) through gear and clutch (D). The connecting gear box (E) assures shutter and claw synchronization. Light source (not shown) projects beam through film gate aperture (F). Frame adjuster (G) moves gate up or down for frame-line registration, is anchored to body (H). Rheostat (I) controls current going to motor to set fps rate. Lever (J) disconnects motor from shutter and claw for single-frame projection. Knob (K) allows one frame at a time advance.

fps rate. The resistors allow only a fixed amount of current to reach the motor. Obviously, fluctuations in house current will affect the steadiness of fps rate.

Once loaded on the feed reel arm, the film leader goes through the first sprocket drive. During regular projection the feed reel runs free—the film is pulled from the reel by the continuous action of the sprocket drive. After leaving the sprocket drive the film forms a loop—and if you've ever lost the loop you know why it's important. It prevents the film from binding and being damaged as it passes from continuous action to an intermittent one in the gate. The film is pulled through the gate one frame at a time by a claw. As in your camera, the claw engages sprocket holes, pulls the frame into position, withdraws, and rises to engage the next frame (see illustration page 98). Each frame remains stationary in the gate for a fraction of a second.

While most cameras have one-toothed claws, projector claws usually have two teeth. Each tooth engages a separate sprocket hole, which places less strain on the film and at the same time provides better registration (frame positioning) in the gate in front of the aperture.

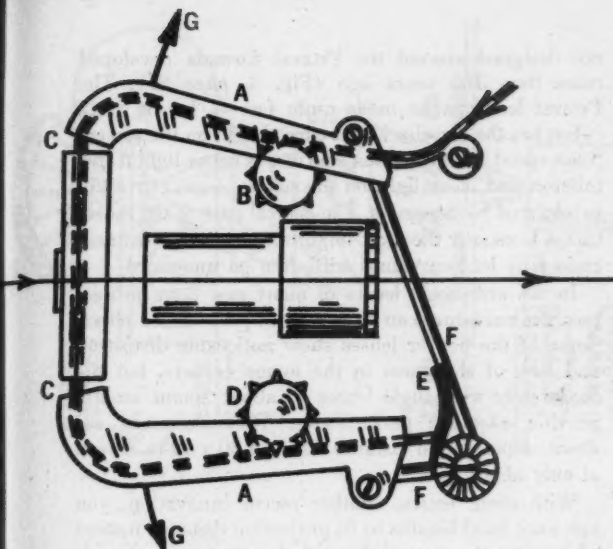
The shutters in your camera and projector are both rotating flat plates. But while the camera shutter opens only once per frame, the projector shutter is usually divided into three open and three closed sections (Fig. 1), and the shutter opens and closes three times for each

frame. Flicker is greatly reduced because the eye tends to retain the image of light for a time after it's cut off.

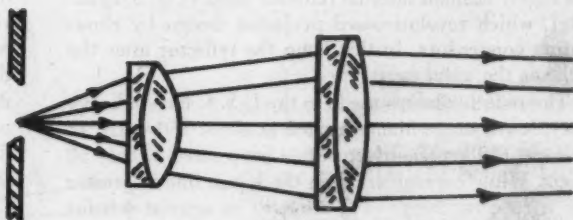
The open sections on your projector shutter are larger than the closed ones, as you can see from Fig. 1, so that each frame is projected for a long enough time to appear bright. In the Keystone K110-AZ, for example, the shutter is open a total of $\frac{3}{4}$ of a cycle. The three-bladed shutter rotates once per frame. Thus at silent speed (16 fps) the shutter interrupts the light 48 times per second, at sound speed (24 fps) 72 times per second. A few rare shutters with only one opening rotate at the rate of 3X per frame.

The shutter on the Bolex 18-5 8mm projector differs somewhat from other machines. The Bolex is a two-speed machine—18 fps for normal silent footage projection and 5 fps for a slow-motion effect utilizing normally shot footage. The shutter ratio is $\frac{7}{9}$ open time to $\frac{2}{9}$ closed time for regular projection. But even with such a high ratio, flicker at 5 fps could be objectionable. So the Bolex uses a variable shutter. A special double-bladed attachment on the shutter divides each of the three openings into three more openings for a total of 9. The result is a flashing rate of 45 per sec.—only three less than at 16 fps—and virtually flickerless projection at 5 fps.

But while the three-bladed shutter provides a comfortable viewing image it allows precious little time to



3. THE PETZVAL LENS: The basic design for the lens in your projector was developed more than 100 years ago. The two achromatic elements in the lens are designed to balance out each other's aberrations. The Petzval design produces image curvature on the screen. Since, in motion pictures, the central portion of the image dominates the viewer's eye, this curvature usually goes unnoticed.



2. HOW AUTOMATIC THREADING WORKS: Several systems are used. Illustration, left, follows Bell & Howell design. To start automatic threading, turn projector on and depress upper and lower loop-formers or guides (A). Insert film leader by hand into feed spool sprocket drive (B). From then on, machine works automatically. Film goes through formers and film gate (C) to take-up sprocket drive (D). As it emerges from lower guide it is pulled against trip-out lever on lower film guide idler (E). This releases connecting lever inside projector (F) which in turn snaps formers away from film which has formed loop (G). Film continues to takeup reel where teeth on reel hub engage sprocket holes and start taking up. In some machines film pressure on formers causes them to snap out of way. Not all machines with automatic threading also have the automatic reel takeup feature.

move one frame out of the gate and the next one in.

The major mechanical problem faced by manufacturers is one of assuring film stability—flatness of the frame in the gate and absence of side-to-side movement. Even with film guides, a short gate permits the sprocket drive to move the film out of position when the claw isn't engaged in the sprocket holes to hold footage in the correct path. A really long gate increases stability—but it adds more metal to scratch film. As with most engineering problems that must be solved with a reasonable price in mind, manufacturers compromise. Most projector film gates are about 1¾-in. long—sufficient to provide a high level of film stability but not long enough to endanger the film surfaces. Even with the compromise, the gates in most projectors are longer than those in most 8 and 16mm cameras. Highly polished, extremely hard metal surfaces with a minimum of contact with the film keep scratches down.

But projector gate design isn't the only thing that affects registration. If your camera has an improperly adjusted gate or film transport, frame lines may fall above or below the sprocket hole center during exposure. This can, of course, be taken care of to some extent with the frame-line adjustment in the projector, which moves the aperture up or down (G, in Fig. 1).

After leaving the gate, film goes to a second sprocket drive that keeps the lower loop formed and at the same

time prevents the film from binding again as its movement changes back from intermittent to continuous. The take-up reel, spinning at a constant rate, picks up the film and the cycle is completed.

Your machine has one more job—rewinding the footage onto the original reel. Practically all 8 and 16mm silent machines and most 16mm sound machines have powered rewinds of some sort. One-way clutches on the feed and takeup spindles holding the reels make it possible to run the projector forward or backward. When you switch to forward, the clutch on the takeup reel spindle engages and the clutch on the feed reel spindle disengages. Switch to rewind, and the clutch on the feed reel spindle engages and the one on the take-up reel spindle disengages. In looking at a prospective projector purchase, make sure that there's no free play in the spindles to indicate improperly working clutches.

Now let's turn from the mechanical to the optical system, starting from the back with the projection lamp. Most 16mm machines have either 750 or 1000-watt conventional filament lamps. The filaments are fairly thin and have a great many coils requiring high voltages to produce sufficient screen illumination. Older 8mm machines using conventional lamps have wattages from 300 to 1000. The problem of getting enough light on the screen is complicated by the small size of the gate aperture. Increasing the wattage of conventional lamps

—like boosting the horsepower in an automobile—is one way to get more light on the screen. But this raises the cost, since it necessitates a powerful blower.

The lamp requires a reflector behind it and a series of condensers in front (Fig. 4, *opposite*). The reflector re-images the filament on itself and is slightly angled to fill in the spaces between the filament coils. The light goes forward through a series of condensers which concentrates most of the light beam on the frame. The condensers represent another compromise—between color correction (which prevents color fringing of the screen image) and aberration correction (which prevents too much light loss).

But no matter what manufacturers do with conventional lamps they are hard pressed to maintain the required 8 to 10 foot-candles of light on the screen. They do in most cases—but it costs money.

The major breakthrough came around 1958 with the development by both General Electric and Sylvania of the highly efficient internal reflector lamp (Fig. 5, *opposite*), which revolutionized projector design by eliminating condensers. In this lamp the reflector aims the light at the gate.

The reflector lamps made in the U.S.A. have a heavy duty, low-wattage filament rated at about 150 watts. In Europe, Philips manufacturers a lamp rated at only 50 watts. While current draw on the house line is greater for a reflector lamp— $7\frac{1}{2}$ amperes as against 4.8 for the conventional 500-watt lamp—they burn cooler, because it takes less voltage to heat a heavy filament with fewer coils than a light filament with more coils (Fig. 6, *opposite*). Reflector lamps use either 12 or 21 volts, and 115-volt house line current is reduced by means of a step-down transformer in the projector. This reduces the need for heavy duty blowers, cutting costs.

Dichroic lamps are another advance in the reflector lamp field. Instead of a metal coating the reflector has a special film that reflects all the visible light but not infrared. Since infrared generates most of the heat, dichroic lamp projectors tend to be cooler.

With the elimination of condensers and the need for smaller blowers, designers have turned their attention to low silhouette designs—as in some of the new Keystone and Argus projectors.

The reflector lamp is hardly the last step in light source design. It's quite possible with modern films and lenses to achieve fairly large screen images—as much as 6 to 9 ft. wide. But for truly big audiences the present 8mm systems just aren't good enough and 16mm is still a must. The compact lamps—the type used in big searchlights—may hold the answer. The lamps are about the brightest light source ever developed and it may be feasible to produce them someday in 150-watt sizes for 8mm machines.

Now, let's take a look at the projector lens and the job it has to do. The average living room allows you a distance of about 17 to 18 ft. between screen and projector—barely enough to fill a 30 x 40-in. screen.

The normal 8mm projector lens has a 25mm focal length, and the 16mm has a 50mm focal length. Both

are designed around the Petzval formula developed more than 100 years ago (Fig. 3, page 81). The Petzval lens can be made quite fast— $f/1.4$ or $f/1.2$ —but has the drawback of a curved field on the screen. Since speed in a projection lens means better light transmission and more light on the screen, some curvature is tolerated by designers. The central part of the movie image is usually the most important, so corner softness caused by lens curvature will often go unnoticed.

In the wide-angle lenses of many new 8mm projectors, the curvature can have a more pronounced effect. Some of the poorer lenses show noticeable distortion and lack of sharpness in the image corners, but the moderately wide-angle lenses of about 20mm usually provide adequate performance. They definitely cut down on projection distance, filling a 30 x 40-in. screen at only about 15 ft.

With zoom lenses, another recent innovation, you can vary focal lengths to fit projection distance instead of moving the screen. A good, low-cost zoom lens is virtually impossible to make because of the involved corrections for aberrations and the need for keeping the lens in focus over a wide range of focal lengths. Also, speeds must be kept to at least $f/1.9$, further complicating design. Thus, most projector zoom lenses do not compare in sharpness with single focal-length lenses, and certainly not with good camera zoom lenses. If they did, the projectors would be most expensive.

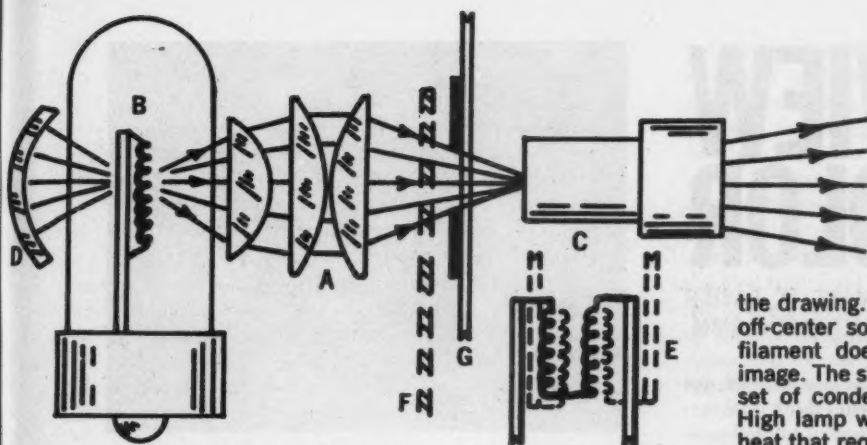
When is a screen image sharp?

Just how sharp does a projection lens have to be before it provides a satisfactory image? The human eye can clearly see a sharply defined object 2mm wide at a distance of 8 ft. This would roughly be the best distance for viewing a 30 x 40-in. screen image with 18 ft. between screen and projector.

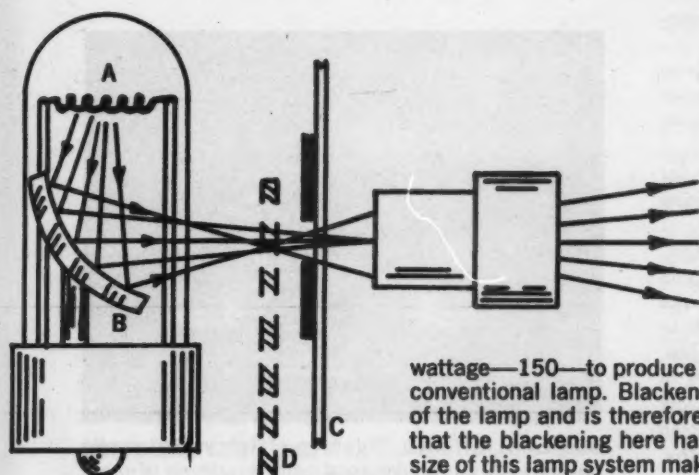
Now, to obtain that 40-in. image the 6mm-wide 8mm frame must be magnified 166X—a resolving power requirement of 83 lines per millimeter ($166 \div 2$). Nice if you could have it—but this is beyond the limits of most 8mm camera lenses and the sharpness of generally available films. Most top-rated 8mm movie lenses provide a resolving power of about 70 to 75 lines per mm at their best aperture. Since some fall-off can be expected at the corners—both in taking and projecting—we accept an average, overall screen resolution of about 50 to 60 lines as being satisfactory to the eye. Apparent sharpness is also aided by the fact that the image “moves.” Generally, 16mm film and projectors produce better images than 8mm, as the frame is 4.9X larger.

Image brightness and contrast also have a lot to do with what we'll accept as sharp. Brightness fall-off at the corners of more than about 50% makes the image look dark and unsharp.

The projectors of just a few years ago were truly austere creations. But today's machine has refinements that make projection a lot easier and the projector itself a good deal more versatile. Some of the refinements you may be interested in are automatic threading, single-frame projection, and built- (Continued on page 98)

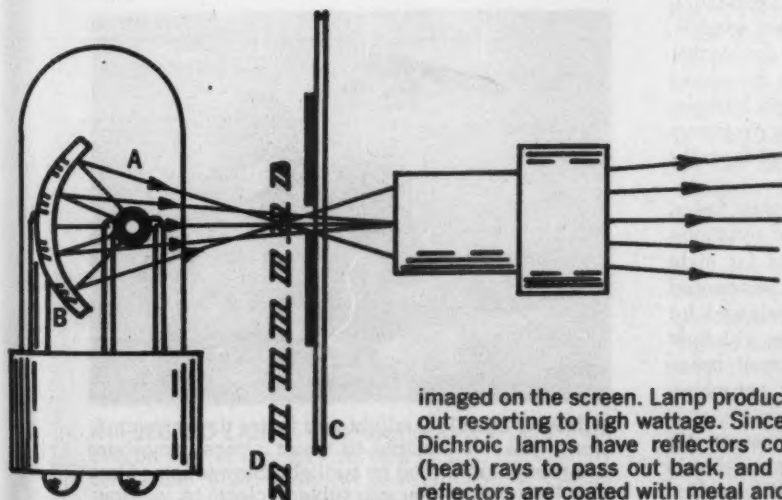


4. LAMP AND CONDENSOR SYSTEM: The condensor lenses (A) project an image of the box-like filament in the lamp (B) on the back of the projection lens (C). The external rear mirror (D) picks up light from back of the lamp and makes an image of the box filament on itself as shown by insert (E) at lower right-hand corner of the drawing. The mirror is positioned slightly off-center so that the reflected image of the filament does not coincide with the direct image. The shutter (F) is situated between the set of condensor lenses and the film gate. High lamp wattage produces a great deal of heat that requires a powerful blower.



5. OFF-AXIS REFLECTOR LAMP: This system completely eliminates conventional condensers. The box filament (A) is mounted above the elliptically curved reflector (B) off the lamp-to-film axis. The reflector directs the filament image to the rear of the lens. The mirrors are purposely made less than perfect to prevent imaging of the filament on the rear of the lens. Instead, a smear of light goes through the gate. Lamps use considerably less

wattage—150—to produce light output roughly equal to that of a 500-watt conventional lamp. Blackening takes place above the filament at the top of the lamp and is therefore out of the path of the light path. This means that the blackening here has little effect on lamp life. Also, much smaller size of this lamp system makes projector streamlining possible.



6. ON-AXIS INTERNAL REFLECTOR: A heavy wire filament is placed ahead of an elliptical reflector, but in line with lamp-to-film axis. This provides slightly less light smearing at the gate and somewhat better light concentration. The reflector produces a rough filament image at the gate (C), beyond the shutter (D), but since some smearing effect is retained, filament is not

imaged on the screen. Lamp produces much useful light on the screen without resorting to high wattage. Since voltage is also low, lamp burns cooler. Dichroic lamps have reflectors coated with a film that allows infrared (heat) rays to pass out back, and so they burn cooler than lamps whose reflectors are coated with metal and reflect the infrared.

A DIM VIEW WITH COLOR

FASTER COLOR FILMS NOW MAKE IT EASIER TO SHOOT BY AVAILABLE LIGHT WITH 8MM.

ONCE, NO SENSIBLE 8mm movie maker—or at least one who had to pay for his own film—would think of shooting indoors without some fairly powerful photofloods. Any daring soul who tried available light movies in most cases restricted his shooting to electric signs, store fronts and perhaps an occasional scene shot indoors by sunlight coming through a window. With a really fast lens— $f/1.1$ or $f/0.9$ —he might tackle somewhat more difficult lighting situations.

But if you haven't taken advantage of new fast 8mm color films for available light—Anso Kodachrome II and Kodak Kodachrome II—you're missing an opportunity for a really new type of image.

Your present equipment should do admirably for available light. Even a lens as slow as $f/2.5$ has definite possibilities, while the more usual $f/1.9$ lens on modern 8mm cameras can deliver well-exposed footage under a wide variety of conditions. And if you have a lens as fast as $f/1.4$, $f/1.1$ or $f/0.9$ you're equipped to tackle scenes that used to be best left to 35mm still camera enthusiasts with super-speed films.

Anso Kodachrome (E. I. 20) is available only in daylight emulsions. But that doesn't stop you from shooting available light scenes where the illumination comes from fluorescent lamps of daylight quality. Scenes like the one *top this page* can be shot in any kitchen with light walls and a comfortably high light level from a fluorescent fixture. Naturally, you can also use Kodachrome for indoor scenes where illumination is from sunlight streaming through an open window, as in the shot *bottom this page*. The speed, double that of regular Kodachrome, lets you shoot with the subject some distance from the window, where light intensity may be somewhat weaker. Thus, when your youngster does something for the first time, you just pick up the camera and start shooting.

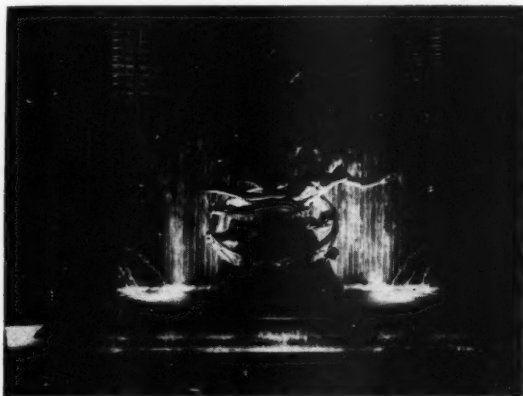
Kodachrome II Daylight (E. I. 25) is slightly faster, and can be used for the same available light situations.

But most people think of available light for night scenes lit by tungsten fixtures. Here, we'd recommend Kodachrome II Type A (E. I. 40). It's balanced for regular photofloods but delivers good images with light sources of lower color temperatures. Overall image color may tend slightly toward red—but not objectionably so, we've found.

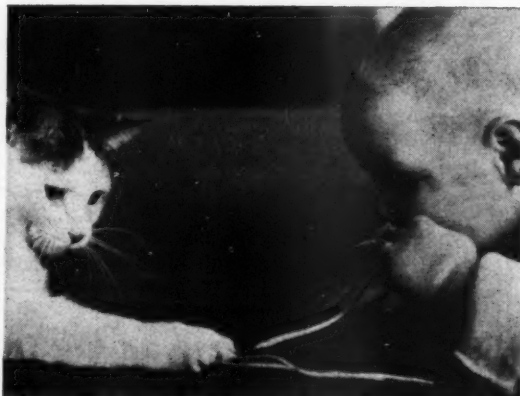
The photo *middle this page* and all those on the *opposite page* represent various scenes that we shot in and around New York using Kodachrome II 8mm film.



FLUORESCENT LIGHTING: Many kitchen fixtures throw enough light for impromptu shooting. Shot above was made with two units of daylight quality. Use Daylight Kodachrome II or Moviechrome.



DISPLAY LIGHTING: This type of lighting is usually strong enough to give good color rendition of main subject. But, as in shot above, surrounding details are lost. Often you can shoot at $f/2.5$ or smaller.



WINDOW LIGHT: Sunlight and faster daylight emulsions make it feasible to shoot almost anywhere in a room illuminated by sunlight. Slower color films usually require placing subject close to window.



SPORTS LIGHTING: Not all arenas are well lit. But most supply sufficient light to shoot with Kodachrome II, depending on film's latitude to deliver an acceptable image. Best bet—shoot wide open.



OVERHEAD LIGHTING: Well-lit areas, as this newsstand in a subway, are easy for $f/1.9$ or even slower lenses. Overhead lighting is diffused by magazines. Take close-up reading on darkest area.



REFLECTED LIGHT: This sports shot differs from one on top, where floor surface is dull. Here, shiny basketball floor helps fill shadows, boost overall light level. Light uniform and skin of player helps.

Using your meter correctly is an important part of successful available light movies. Best results (*top and bottom opposite page and middle this page*) are obtained by taking close-up readings from important details in the scene.

But for sports and many night scenes you won't be able to get close enough. We've found that overall readings for long shots where there are few shadows will often provide adequate results provided the cell is shielded from light fixtures. But for close-ups with your tele or the longest focal length on your zoom lens, open up slightly for better shadow detail. Also, with a scene dominated by, say, a well-lit theatre marquee, it's wise to open the lens slightly to prevent underexposure of the rest of the scene. With automatic electric eye cameras, take the reading on automatic and then use the manual adjustment to hold the lens at the indicated f-number.

Your electric eye camera may give you a problem in determining what you can and can't shoot under available light conditions. If you have a selenium cell electric eye camera, the meter may not be sensitive enough to read under poor light conditions—even though there's enough illumination to shoot at $f/1.9$, for example. Cadmium sulfide cells—in cameras or as accessory meters—are generally more sensitive. There are two ways to overcome this first problem. One is to shoot a test roll or two under conditions that you can expect to film under at some future time. Use several different exposures for each shot. For example, you may want to shoot a wedding by available light. A test roll will tell you quickly enough if it can be done with the existing light fixtures and which f-number will give the most pleasing results.

The second method is to use an accessory meter. Even the inexpensive ones have a greater range of sensitivity than many electric eye cameras. Quite often they'll indicate that you can shoot when the electric eye warning flag says you can't.

But what happens when your meter indicates that you need one more f-number than the maximum opening on your lens? Here you must consider film latitude—the degree of under- or overexposure that will still result in an acceptable image. Kodachrome II provides acceptable results with as much as one (or slightly more than one) f-number underexposure. Thus, if you have an $f/1.9$ lens and the meter indicates you need $f/1.4$, you can still shoot.

In shooting available light, you'll have to pay more attention to focusing, since you'll be shooting most of the time at fairly wide apertures: depth of field is shallow and even minor errors in judgment can be serious. Through-the-lens focusing cameras—except those with split-image rangefinders—are difficult to focus at night. A good accessory split-image rangefinder is a big help.

The very nature of available light shooting—the quickly captured scene under adverse conditions—makes it impossible to use a tripod most of the time. A pistol grip or chest pod will give you mobility and a large degree of camera support for scenes when you must shoot quickly.—M.A.M.

MODERN TESTS

NEWEST CAMERAS • LATEST FILMS • IMPORTANT ACCESSORIES

MODERN PHOTOGRAPHY'S exclusive monthly equipment report devoted to informative, unbiased field tests of production models submitted to and passed as acceptable by our technical department.

BRONICA S 2¼ x 2¼ SINGLE-LENS REFLEX



Manufacturer's specifications: Bronica S 2¼ x 2¼ single-lens reflex. **Lens:** 5-element interchangeable 75mm f/2.8 Nikkor with stops to f/22, focusing to 18 in. **Shutter:** Cloth focal-plane with speeds from 1 to 1/1000 sec. plus B, FPX sync. **Focusing:** Waist-level reflex with interchangeable hood. **Other features:** Automatic diaphragm reopens instantly; rapid-return mirror; interchangeable roll film backs; preview stop-down button; folding rapid wind lever. **Price:** \$399.50. **Importer:** Caprod Ltd., 111 Fifth Avenue, New York 3, N.Y.

Any 2¼ x 2¼ completely automatic single-lens reflex with interchangeable backs and the odd, unique shape is a hellishly compli-

cated mechanism, as the history of the breed will attest. Manufacturer X has lovingly laid to rest a less-than-100%-reliable focal-plane-shutter model in favor of a leaf-shutter camera. This camera today is a fine professional example of a bug-free unit. First attempts to fill the focal-plane-shutter camera void promised much. The handsome gray and chrome finished, stainless steel Bronica Z seemed to offer just about every possible SLR appurtenance including an astounding sliding down interior mirror. This mirror allowed a very short (50mm f/3.5) wide-angle lens to be used automatically. But even after the majority of the initial bugs were ironed from early cameras, the Z remained a delicate machine.

Camera manufacturers often insist that new models solve all the problems of the old. We were therefore understandably quite skeptical upon receipt of a production sample of the new, almost \$100-lower-priced, S model. However, after some months of extremely rigorous testing and extended use, we must report that the Bronica S is, in our opinion, a vastly superior machine. We couldn't find a single bug. Despite efforts on our part to trip up the mechanisms and stick our fingers through the shutter, and after the S received more than a few unkind bumps and bruises, we are happy to report that the camera worked perfectly in every instance. It never misfired and never jammed. Individual frames were evenly spaced. Each roll wound up tightly.

A cursory glance at the new S reveals only the few surface feature changes. There's a folding rewind crank set concentrically within the focusing knob. The second speed dial with slow speeds from 10 sec. to 1 sec. has been eliminated in favor of a single ring with speeds from 1 to 1/1000 sec. A heavy splash of chrome trim and minor exterior alterations do

make the Bronica look less like Brand X (and also less like the Bronica Z).

None of these changes is basically responsible for the exceptional behavior of the camera itself.

Inside the camera the basic viewing and focusing design continues unchanged from the Bronica Z. Bayonet mounted lenses of both models are fully compatible. When you press the shutter release, the mirror slides downward, the lens diaphragm closes, a blind covers the ground glass to prevent light leakage and the shutter travels to the accompaniment of a highly audible but satisfyingly sharp clatter. Immediately afterwards, the mirror springs back, the blind withdraws and the aperture reopens fully.

The big change will be found behind the shutter—in the film back. The back of the new S model does not interchange with that of the Z for good reason: it is completely different in design. Instead of a very delicate but completely automatic three-piece back which was complicated to load (three hands helped), the rear plate of the sturdy new semi-automatic back springs open to reveal a single heavily constructed metal cage which can be removed. Wind the film around the cage and turn the take-up spool until the arrows on the film backing line up with red arrows on the cage. Now replace the cage in the back. Lock it in place and wind away. The film will stop at the first frame.

The new back is quite ingenious. To prevent any light reflections from the metal slide as it is removed or inserted, or light leakage through the slide slit in case sunlight is falling on it, each back is equipped with a rubberized cloth blind. This blind grips the slide edge and is pulled across the front of the film as the slide is inserted. It withdraws with the slide, covering the slide entrance during shooting. In addition, the back interior is padded with a black matte rubberized material to soften bumps and jars and eliminate light reflections.

On top of the back is a small rectangular frame. It's actually a film reminder slot and is just big enough to hold the flap end of the 120 roll film box. You won't forget to change film box ends since you must flip up this rectangle in order to reach the sliding bar which releases the loading catch.

You no longer need to remove the back to load the film; but you can if you want to, or wish to interchange backs in mid-roll. Just push in on the metal dark slide and the back separates instantly as in the Z model. The slides can't be removed until the back is replaced and when in place prevent accidental firing of the camera.

The ability of the camera to be

loaded without the back being removed makes it feasible to purchase separate interior cages (\$32.50) and keep them preloaded for fast film changes. Of course, for mid-roll changes you'll need the whole interchangeable back (\$82.50).

There are several other mechanical changes that merit attention. The focusing knob, when rotated, causes the lens tube to move in and out. On the Z test, we reported some wobble in the tube. Improved gearing on the tube of the S has made it as rigid as a cannon.

In shooting we found it advisable to cradle the Bronica in the palm of our left hand with our left forefinger stretched across to the shutter release. This freed our right hand to operate the focusing knob and film wind.

The folding film and shutter wind crank is a vast improvement over the Z's knob. On the Z you focus with the knob then pull the same knob outward and turn to advance the film. Consequently you could conceivably change focus by error between shots. The nearly four-and-a-half revolutions of the wind knob made rapid operation over a long shooting session a fairly arm-wearing technique. With the wind lever you can grind 12 exposures through the Bronica S in less than 30 seconds, using relatively little effort.

Changing apertures on the lens mount of the older Z model was always quite simple. However, the single shutter-speed dial of the S is a vast improvement over the double dials of the Z. Speeds can now be set without the high finger pressure necessary on the Z model. The lens mount has an outer bayonet to help secure extremely long lenses.

Although there are countless small changes which could be analyzed, the other major camera features—good evenness of illumination and brightness of the ground glass, operation of the depth-of-field preview button, impossibility of mismatching wound back with unwound camera (or vice-versa), individual estimation of lenses (MODERN found all to be superior optics), etc., etc.—are fully discussed in the test of the Z model published in December 1959. However, you'll note one important omission on the new camera. It no longer has a tiny screw to unjam the mechanism should anything go wrong. There's a good reason why it's no longer featured: the Bronica S doesn't need it.—H.K.

Editor's note: We are told by the importer that the older Bronica Z will henceforth be delivered under the description "Bronica Deluxe." It's claimed that the Z will incorporate the

mechanical improvements of the Model S while retaining such features of the Bronica Z as: shutter speeds from 10 to 1/1250 sec.; self timer; three-piece back, etc.

MAMIYAFLEX C2 MULTI-LENS REFLEX



Manufacturer's specifications: Mamiyaflex C2 Professional 2 1/4 twin-lens interchangeable lens reflex camera. Lens: 80mm f/2.8 Mamiya-Sekor taking and viewing with stops to f/32. Viewing: Waist-level with fine focusing screen, parallax correction marks, eye-level sportsfinder. Shutter: Seikosha-S manual setting leaf type with speeds 1 to 1/500 sec., B, and MX sync. Other features: Twin knurled focusing knobs; semi-automatic film advance; removable focusing hood; accessory rapid film wind crank (\$11.50); mirror eye-level focusing hood (\$9.95); accessory hand grip (\$9.75); interchangeable 65mm f/3.5 Mamiya-Sekor lens assembly in Seikosha shutter with speeds 1 to 1/500 sec., B and MX sync (\$149.50); 105mm f/3.5 Mamiya-Sekor lens assembly in Seikosha shutter with speeds 1 to 1/500 sec., B and MX sync (\$99.50); 135mm f/4.5 Mamiya-Sekor lens assembly in Seikosha shutter with speeds 1 to 1/500 sec., B and MX sync (\$109.50); 180mm f/4.5 Mamiya-Sekor lens assembly in Seikosha shutter with speeds 1 to 1/500 sec., B and MX sync (\$149.50). Price: With 80mm f/2.8 lens, \$179.50 (body alone, \$95). Importer: Caprod, Ltd., 111 Fifth Ave., New York 3, N. Y.

Ever since the first twin-lens 2 1/4 reflex appeared in the late 1920's, the more serious picture takers have been asking for a similar camera, but one which accepts a complete line of interchangeable lenses. In 1957 the Mamiyaflex Professional was an-

nounced. It was the first practical solution to the interchangeable lens problem. This camera, called the Model C, along with the 80mm f/2.8, 105mm f/3.5, and 135mm f/4.5 Mamiya-Sekor lenses, was reported on in the December 1957 MODERN. The C2 Mamiyaflex is a slightly improved version of the Model C. Since the Mamiyaflex has never been Modern Tested ("Modern Tests" started in 1958), and since there are two additional available lenses for the camera, we decided to take this opportunity to Modern Test the entire set-up.

Of course, it is the only 2 1/4 twin-lens reflex with interchangeable lenses presently available. Instead of automatic parallax compensation found only on the more expensive twin-lens reflexes, the Mamiyaflex has two compensation marks etched into its fine focusing screen to be used as guides for shooting at closer-than-normal distances. Unlike fixed-lens 2 1/4 reflexes, which usually limit focusing to about 3 ft., the Mamiyaflex' extra long bellows permits focusing to 4-in. with the 65mm lens, 7 in. with the 80mm lens, 16 in. with the 105mm lens, 24 in. with the 135mm lens, and 36 in. with the 180mm lens.

To make a camera rich in some features (interchangeable lenses) while keeping the price down, the Mamiya people had to give up such things as a shutter which is automatically cocked when the film is advanced. With all five lenses the Mamiyaflex shutters must be cocked manually before each exposure. The cocking lever

IN NEXT MONTH'S MODERN

Mammoth depth-of-field tables for 35mm camera lenses.

is situated on the left side of the camera and the release on the right side, and film advance is semi-automatic—you release a lever and then wind an easy-to-grip knurled film advance knob (there's also an accessory crank available) until it automatically stops. It's possible to make a double exposure since there is no flag or other device to warn you that you have already made one. It's also just as simple to get blank frames since there is no warning mechanism connected to the film advance.

To change lens assemblies, set the lens at infinity focus, then position the lens lock lever at "unlock" and unhook a large steel spring which firmly holds the lens assembly on the camera. Incidentally, when the lens lock (Continued on page 88)

MODERN TESTS

(Continued from page 87)

has been set to "unlock," a red flag is automatically positioned under the focusing screen, indicating that a baffle is covering the film plane—this prevents unnecessary film fogging while you change lenses. To secure any of the lenses on the camera, you simply reverse the procedure.

These features are common to both the Model C, introduced in 1957, and the new Model C2. The innovations on the newer camera are simple constructional improvements: a more solidly built metal base which supports the bellows and lens assemblies, and a second focusing knob—so now there is one on each side of the camera's lower structure.

In testing the 65mm f/3.5 lens we found very good sharpness at f/3.5 with some sharpness fall-off at the corners. When it was stopped down to f/5.6 to f/8, sharpness was excellent with slight fall-off in the corners. Overall sharpness decreased slightly at smaller apertures.

Our tests of the 80mm f/2.8 lens showed that sharpness was good at f/2.8 with some fall-off at the corners. When stopped down to f/5.6, sharpness was very good with slight fall-off at the corners. Overall sharpness decreased slightly at smaller apertures.

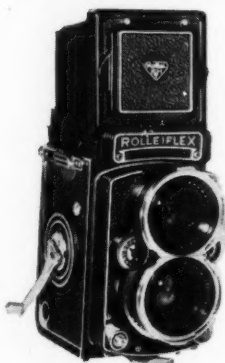
In testing the 105mm f/3.5 lens we found sharpness at f/3.5 good with some sharpness fall-off at the corners. When it was stopped down at f/5.6 to f/8, sharpness was very good with slight corner fall-off. Overall sharpness decreased slightly at smaller apertures.

With the 135mm f/4.5 lens our tests showed good sharpness at f/4.5 with some fall-off at the corners. Sharpness was good when the lens was stopped down to f/8 to f/11, with slight fall-off in the corners. Overall sharpness decreased slightly at smaller apertures.

In testing the 180mm f/4.5 lens we found sharpness good at f/4.5, with some fall-off at the corners. When it was stopped down to f/8 to f/11, sharpness was excellent with slight sharpness fall-off in the corners. At smaller apertures overall sharpness decreased slightly.

Some of the corner sharpness fall-off found with these lenses is caused by curvature of field. At all but moderately close focusing distances this effect of curvature of field on corner sharpness is slight.—E.M.

55MM DISTAGON LENS ON WIDE-ANGLE ROLLEI



Manufacturer's specifications: Wide-Angle Rolleiflex 2 1/4 x 2 1/4 twin-lens reflex. **Lens:** 55mm f/4 Distagon taking and 55mm f/4 Heidosmat viewing, stops to f/22, focusing to 2 ft. **Shutter:** Synchro-Compur with speeds from 1 to 1/500 sec., plus B, MX sync, self timer. **Viewing:** Waist-level with Rollei-clear focusing screen, automatic parallax compensation, eye-level sports-type viewing. **Other features:** Same as Tele-Rolleiflex. **Price:** \$399.50. **Importers:** Burleigh Brooks, Inc., 420 Grand Ave., Englewood, N. J., and Ponder and Best, 814 N. Cole Ave., Hollywood 38, Calif.

The obvious follow-up to a telephoto camera such as the recently introduced Tele-Rolleiflex is a wide-angle camera—and here we have the appropriately named Wide-Angle Rolleiflex. It looks and handles exactly like its tele cousin. In fact, as far as physical appearance is concerned, its inverted telephoto design 55mm lenses jut out almost as far as the 135mm lenses of the Tele-Rolleiflex.

Nearly all features of the Wide-Angle Rolleiflex are identical to the Tele's, such as: film loading; automatic film advance; dialed shutter and f-number setting with provision for interlinking to make use of EVS; removable focusing hood and screen so that the Rollei Prism or the new projector adapter (not yet available) can be added; a removable glass plate for insuring a flat film plane for optimum sharpness (see "Modern Tests" report on the Tele-Rolleiflex, January 1960).

Minor additions consist of a simple

optical sportsfinder built into the hood (on all other Rolleis this is just a square hole) to accommodate a 71° angle of view, the same provided by the 55mm lens. Also, the focusing magnifier pops into place when you press a small button situated on top of the hood.

Our tests made with the 55mm f/4 Carl Zeiss Distagon lens showed very good sharpness wide-open with some sharpness fall-off at the edges. At f/8 sharpness was excellent with only slight fall-off at the edges. Overall sharpness remained the same at smaller apertures. Some of the corner sharpness fall-off with this lens is caused by curvature of field. At all but moderately close focusing distances this effect is slight.

When we first examined the Wide-Angle Rolleiflex, we thought that the moderate apertured 55mm f/4 Zeiss Distagon lens would produce a darker, more difficult to focus ground-glass image than the f/2.8- and f/3.5-lensed Rolleis we're accustomed to using. To our amazement, the Wide-Angle Rolleiflex showed no apparent loss of viewing image brightness. It seems as though its highly efficient focusing screen extends the light-producing powers of the f/4 lens. Unlike many reflex cameras which are quite difficult to focus when used with shorter-than-normal focal-length lenses, focusing with the Wide-Angle Rolleiflex is a pleasure—the image seems to pop in and out of focus abruptly.

Workmanship on the Wide-Angle Rolleiflex is the same as on all Rolleiflex cameras—impeccable. And its performance is typical of what we'd expect from any superb precision instrument.—E.M.

HEILAND PENTAX 3/21 UNIQUE REFLEX METER



Manufacturer's specifications: Heiland Pentax 3/21 Exposure Meter. **Features:** ASA indexes 3-6400, apertures f/1 to f/45, speeds 4 sec. to 1/4000, dual range with meter needle indicator visible through reflex viewing finder; power supplied by two 1.3-volt

mercury cells, one 22.5-volt dry battery. Price: \$79.50. Importer: Heiland Division, Minneapolis-Honeywell, 5200 E. Evans Ave., Denver 22, Colo.

Exposure meters up to a few years ago were like many pet dogs—they love everything and have no discrimination. Their selenium cells take in a vast angle of view, often far larger than that of the camera lens, and produce an average exposure reading. For more critical work, you move in for a close-up reading of the subject. If this isn't feasible, you might find a substitute subject for purposes of exposure calculating. These meters have no finders. You point them in the direction of the subject and hope your aim is adequate. A football player on a field, a stage actor, a skier in the middle of bright snow are imponderables requiring a meter, crossed fingers and luck. Enthusiasts for long lenses find it virtually impossible to get a proper reading for a narrow angle of view. A few difficult-to-use meters have existed which remedied the situation partly or at great expense. The battery-powered cadmium sulfide cell meters, however, are solving the problem and the 3/21 goes further than any other CdS meter yet available.

It resembles and is the size of a small waist-level single-lens reflex camera. It has a single-element 100mm lens and no diaphragm. On the ground glass, viewed through a conical magnifying hood, you can see a 22° field of view with a small circle marking the 3° covering area.

At the bottom of the viewing area a meter needle and a double scale with both high and low light markings are visible. Locate the important subject material within the interior circle and press the shutter—excuse me, the exposure meter release button. If there's insufficient light, and the needle doesn't swing over appreciably, press the release further. The low-light circuit then goes into operation and you read the needle setting from the low-light scale. The result will be a number from 3 to 18 (the meter calls this an EV number but it isn't). By setting the ASA index and this number on the circular scales around the lens mount you can line up all the possible lens-opening/shutter-speed combinations.

In use we found that the meter could give us an accurate reading of a distant subject speedily, that it was sensitive and quite discriminating—almost too much so, since a tiny shift in aim would change the reading drastically. In addition the meter must be

used with caution if a particularly bright area falls just outside the 3° covering area. In such cases the bright area does inflate the reading. Viewing the scene and scale on the ground glass will require some practice. The non-focusing lens seems to be set at about 6 ft. At near or farther distances it is somewhat difficult to focus your eye on the subject and scale simultaneously. There's a convenient slotted screw head to allow zeroing but no battery check. The batteries should be replaced at least each six months to play it safe. The meter can read a low-light exposure of 1/8 sec. at f/2 with a film having an exposure index of 400. In low light the calculator rings with their between-number markings may be somewhat difficult to see if your eyesight is less than good.

While overall readings of any scene can be calculated by checking both highlight and shadow area and then averaging them out, the physical size and angle of view definitely make the 3/21 meter more of an essential unit for the man interested in obtaining proper exposure of a small element within a scene. The 3/21 can do this with ease.—H.K.

ACUFINE, FAST-WORKING FINE-GRAIN DEVELOPER

Manufacturer's specifications: Acufine film developer. **Features:** Single-powder, high energy, soft-working, usable over wide range of temperatures, designed to give sharp images and low graininess. **Price:** 1 qt. can, \$1.; replenisher, 1 qt., \$1. **Manufacturer:** Baumann Photo-Chemical Corp., 125 West Hubbard St., Chicago 10, Ill.

Acufine is an excellent film developer. It should be considered as being among the top rank products, along with Kodak D-76 and Microdol-X, Ethol UFG, Edwal FG7, and similar formulas which provide high film speed with moderate contrast, low graininess, and good sharpness.

The performance of any developer is the result of a series of compromises. In Acufine these have resulted in a very favorable and useful balance of film speed, contrast, sharpness, and graininess. It was my impression that in its performance and general characteristics Acufine resembles UFG more than it does any of the other developers.

I found that Acufine gave best results with films in the speed class of Kodak Plus-X Pan and Tri-X Pan. It works particularly well with Ansco Super Hypan. With Hypan it appeared to produce slightly more useful film

speed (that is, more shadow detail) than normal development in Ansco Isodol 1:1, and perhaps a shade more than development in Edwal FG7, 1:15, and UFG.

Observers who were asked to judge the overall quality of 15X enlargements of similar subjects similarly exposed and developed in all four formulas were hard put to distinguish any outstanding differences in apparent sharpness and graininess. Since Isodol, UFG, and FG7 have been my favorite combinations with Super Hypan, I felt that this was very good performance by Acufine.

Similarly exposed Kodak films were developed in Acufine, Microdol-X 1:3, D-76 straight and 1:1. These tests indicated that all gave approximately the same very high effective film speed. The Acufine/Plus-X Pan or Tri-X Pan combination produced negatives which can rank in quality alongside the very best possible with any developer.

Acufine developing times are brief. Examples at 70F: Plus-X Pan, 4 min.; Tri-X Pan 35mm, 4 3/4 min.; Ansco Super Hypan 35mm, 7 min. For the very slow films, times are so short (2 min. for Panatomic-X) as to present problems.

The instruction sheet is clear, concise, and gives detailed developing times for many films at temperatures from 65F to 85F. It also recommends exposure indexes for use with the various films. I think this should be explained.

A film speed of 1200 is given for Tri-X Pan. This might lead someone to think that Acufine has the property of boosting film speeds enormously, compared to the results obtainable with standard developers, since Eastman Kodak Co. recommends a film speed of 400 for Tri-X Pan developed normally in D-76 or Microdol-X 1:3.

My experience did not indicate that Acufine produced such an increase in film speed, compared to the Kodak recommended development. However, I found that I could get nicely exposed Tri-X Pan negatives, using a film speed of 1200 in daylight, with subjects and lighting of low to moderate contrast range, and making my readings with an accurate incident light meter or a reflected light meter used correctly against a gray card. I could also get approximately similar results when the films were developed as recommended by Kodak.

In general, I found that I got my best results, under the widest range of conditions, when I set my meter for the film speeds currently recommended by Kodak and Ansco for their films.—J.W

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Without installation, the Junior Mindlens enables you to use 35mm film in your 120 Rolleiflex, Duacord, Grolux, Yashica, Minolta, etc.—yet, you can change back to your regular size any time you wish. Mindlens comes complete with groundglass mask, card, "ridge adapters, counter, ready for use. Shipp. Chgs. 15c **\$3.95**

PARALLAX CORRECTING CLOSE-UP SETS \$2.95

Perfect portraits and close-ups every time—sets fit cameras without any adapters, are easy to use, and are wanted to equal \$20.00 sets in performance. #1 set focuses from 38" to 22" set from 20" to 13" low \$2.95 price includes 2 closeup lenses, prism. Leather case, single 38c, double 69c.

Coating of taking lens — 50c extra per set Sh. Charge 15c

NEW: Ctd. #3 Bayonet Mount set, 13 to 10" in leather case **\$4.75**

COATED CLOSEUP OUTFIT: #1, 2, 3 COATED PARALLAX CORRECTING BAYONET SETS, in triple case, complete only **\$11.95**

BAYONET COATED FILTERS

For Rolleiflex P3.5, Minolta Autocord, Yashica **\$2.19** — for \$5.98

Your choice of red, green, yellow, 82A, 80B, 85C. Skydial, diffuser. **\$2.98**

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Fits Rolleiflex 3.5, Autocord, Yashicamat, other bayonets, holds flashgun in ideal position. COMBI. OFFER B.F. Flash Mount with BC Bounce Flash, with tester, standard cord, ext. outlet, **\$5.55**

Shipping Charge 35c

PARALLAX-ADJUSTER FOR ALL TWINLENES REFLEX CAMERAS

\$1.98 Compensates for difference between viewed and exposed images works even with extreme closeup lenses!

#4 Bayonet Mounts, Filters, Shades, Closeup Sets for PLANAR, XENOTAR available at Higher Cost.

TELEPHOTO-WIDEANGLE LENSES

FOR ROLLEIFLEX (exc. 2.0), ROLLEICORD, YASHICA, RICOH, AUTOCORD, IKOFLEX

Complete with bayonet adapter-filterholders, topograin case. Set consists of adapter, viewing & taking lenses. TELEPHOTO OR WIDEANGLE SET **\$6.95**

Combi Set, all four lenses **\$39.95** **\$19.95**

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Shipp. Charge each lens set 35c, both sets 75c

FOR THE DARK ROOM

ELECTRIC 2-SURFACE ALL METAL DUO-DRIER

with automatic thermostat

GIANT 13 1/2" x 18" WITH PRINT ROLLER & 2 12x17" HEAVY DUTY FERROTYPE PLATES

Yes, Spiratone does it again! A complete, ready-to-use, double surface drier with a capacity of 4 8x10 or 36 2 1/2 x 3 1/2 prints, singleweight or doubleweight, glossy or dull finish — sturdily constructed, as efficient as units costing several times as much, with adjustable apron tension. Works on AC or DC.

FREE with every dryer, Hypack, tells correct fixing time

13" x 18" GIANT DUODRIER, w/o thermostat with 2 12x17" ferrotype plates **\$12.98**

12" x 16" STANDARD DUODRIER with two 10x14" heavy duty ferroplates, for the small darkroom **\$8.98**

with 10x14" ferroplate **\$5.98**

Shipp. Wt.: GIANT 12 lbs., STANDARD 10 lbs., SINGLE 2 1/2 lbs.

Large Bottle Ferro Polish 90c.

ENLARGING TIMER

AUTOMATICALLY SHUTS OFF EXPOSURE

60 sec. range, with second markings. Current shuts off automatically at end of desired time interval. Built-in lock holds knob at desired position, until toggle is released. Adjustable stop for repeat exposures. Manual operation for focusing enlarger or printer plugs right into timer receptacle. Shipp. Chgs. 50c. **\$8.49**

8x10 ENAMEL TRAYS

3 for **\$3.98**

You'd expect to pay over \$2.00 each for these fine acid-proof trays which Spiratone offers you at less than half the usual cost.

11" x 14" ENAMEL TRAYS **\$2.50** each 3 for **\$6.50**

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Shipp. Wt. 5 lbs., (3) 19 lbs.

11x14 EASEL

Spiratone priced at **\$4.95**

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Simple bayonet lock for different sized adjustments. Vents for quick changing of liquids. Agitating rod. Lamproot reel loads in 12, 127, seconds in darkroom — other operations in 10, 116, daylight. Transparent for color films. Easy 8 or for 35mm. Easy Sh. Wt. worth double, \$3.95

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An efficient paper cutter, with ruled hardwood board, hollow-ground, hardened steel knife on spring. **\$3.98**

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With Steel Board: 10" \$4.45; 14" \$6.85

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Six unusual values in brand new, coated, color-corrected, anastigmatic lenses, specially constructed to give corner to corner sharpness in enlarging — at prices half and less than those you'd expect to pay for such sharp-cutting lenses. Sh. Ch. 25c

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any model complete, exc. lens

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RECOMMENDED STANDARD LENSES, COATED, CLICK-STOPS — REGULAR	2" f 3.5 \$5.95	3" f 3.5 \$6.95	3 1/2" f 4.5 \$7.95
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BELLOWS, BACK & PINION FOCUSING	—	—	—
LINE SWITCH	—	—	—
ALL METAL CONSTRUCTION	—	—	—
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2 enlarging lamps 99c

*Diffusion Glass Incl.

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Please see next page for more values

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More POWERFUL than ever and at the LOWEST PRICES in photographic history

FOR 35mm CAMERAS

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USING SERIES VI ADAPTERS \$11.88 each

WITH LIFETIME SERVICE GUARANTEE

Hardest coated, superbly color-corrected; do not affect exposure or lens opening; require no installation. Fit into Series adapter (filterholder) — interchangeable with other adapters, so one lens can be used on many cameras. Spiratone Telephoto lenses bring distant objects closer, help fill entire negative slide with important subject matter, crop out unwanted background. Spiratone Wideangle lenses add coverage in cramped quarters, are wonderful for groups, landscapes. They increase depth-of-field, too, for foreground-to-infinity sharpness.

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40 CAPACITY TRAYS, for TDC, B&H, Viewflex, Keystone, 12 for \$7.48 incl. carry case. Sh. Wt. 6 lbs. Ansco, Sawyer

40 CAPACITY TRAYS, for B&B Bolexomatic, splitprint 12 for \$10.48 incl. carry case. Sh. Wt. 6 lbs.

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To fit Series VI adapter, add \$1.00

ADAPTERS (same camera) SER. V SER. VI \$1.50 \$2.15

6x30 \$16.95

7x35 \$19.95

7x50 \$24.95

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Sh. Ch. 60c

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Fully adjustable mechanical trigger, requires no installation, works through standard cable release socket of most old cameras. Has fitting for standard flash cord. With leather case \$2.94. For flash & strobe Tripper w. BC Bounceflash \$4.89

Shpg. Chgs. 55c

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Fits back of almost every 35mm camera with removable back—lets you check lens, finder accuracy, effect of closeup lenses etc. No installation—snaps in and out of film plane.

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For: LERIA, CANON, NIKON, CONTAX, PRAKTIFLEX, HEXACON, CONTAFLEX, PRACTICA, PRAKTIKA, PENTACON, ARGUS C3, C4, C4C—same your camera, 5 shots in 6 seconds! No installation—fits over winding knob. Shipping Charge 10c

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Sturdy cardboard mounts like those used by photographers, for all size transparencies, to fit all projectors, changers, 2x2" mounts available in standard (double frame) 35mm, single-frame half-size, Mercury, Olympus Pen etc. 35mm, 127 superslide, subminiature (Minolta 16 etc.), square (Rohr-size) 35mm—specify WHICH you want.

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Screw-in filters, most colors each 4.95

Metal Rear or Body cap, each 1.00

Shipping Charges Extra

SPIRATONE SLASHES FILTER COSTS IN HALF! HIGHEST QUALITY OPTICAL GLASS FILTERS

COATED FILTERS IN SERIES SIZES

to fit standard filterholders

For B & W: Lt. Yel., Med. Yel., Green, Red, Orange, Haze.

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Ser. IV \$1.54 Ser. IV \$1.15

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Shpg. Chgs. 1 to 4 filters 15c

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Clip here for this SPECIAL OFFER

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For all Color and black and white film. Eliminate glare and reflections in scenery, water, show-windows — emphasizes clouds, the ONLY sky filter usable with Kodachrome, Anscochrome, Ektachrome. Polarizing Screens have double threaded rings to allow use of extra filter or closeup lens, handle for convenient adjustment of maximum polarizing effect.

Shipping Charge 15c

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Available in Ser. IV (\$1.00), Ser. V (\$1.00), Ser. VI (\$1.25), Ser. VII (\$1.50), Ser. VIII (\$2.00), ONLY 50c for Ser. IV, V, NLY 75c for Ser. VI, VII, with this clipping and your order for \$5.00 worth or more of filters, closeup lenses. Shipping Charge 55c

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Permits use of two closeup lenses (for extreme close-ups: +2 and +3 make +5), closeup lens and filter (correction, conversion, pola), two filters, two minus lenses, at same time. Fits standard filterholders.

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4 x 16x TELEPHOTO \$29.95

FOR TWINLENS, 35MM, POLAROID CAMERAS

Deluxe Leather Case \$1.95

Sensational new lens actually increases the focal length of your camera lens four times: changes a 50mm into 200mm, an 80mm into 320mm and so on. Wonderful for Contaflex, Retina, Rollei (exc. 2.8), Yachica, Minolta etc. Fits Ser. V adapter for Ser. VI to V step-down ring. Lifesize-Finder (for 35mm or Polaroid) \$4.95. Series V Adapter \$1.50 (payment \$1.80). Step-down Ring \$1.00. Ship. Chgs. 75c

similar to 4X, \$21.90

3X (or 4X) incl. leather case, all for \$41.95

Outfit 4X-WA—4X telephoto, case, aux. wideangle, case, all for \$41.95

3 UNIT REFLECTOR OUTFIT \$5.99

• Two aluminum 10" reflectors for #1 or #2 bulbs

• One bullet reflector for spot effects

All three complete with swivel joint, switch, socket, clamp and cord... at a fraction of their usual cost.

SUBSTITUTE: 2 g2, 1 g1 photoflood bulbs 90c.

Sturdy 4 sec. deluxe metal PHOTOFLOOD STAND with dual 4" x 9" extension crossbar, holds two reflectors, extends to 88" COMPLETE 10 PC. OUTFIT \$9.99, contains 3 reflector out fit, deluxe stand, lamps, all as described.

6 ft. alt. 8000LITE alt. photoflood stand \$3.95

Shipping Wt. reflectors 7 lbs., stand & lbs., boom 4 lbs.

SPIRATONE ELEVATING TRIPOD \$11.95

Model E3 For the photographer who insists on maximum sturdiness, yet wants portability. Large camera platform with 7" long panning handle to control tilting and panning; 1/4" diameter legs, full 72" extension with extra-strong 15° geared elevator; positive leg, pan and elevator locks; 3 1/2 lb. net weight. Shpg. Wt. 6 lbs. each item

PROJECTOR TABLE TOP

Cast metal, attaches to Spiratone tripod (no other), making it into sturdy, height-adjustable proj. table, 12x15", for still, movie projectors.

BUY TRIPOD AND PROJECTOR TABLE TOGETHER AND PAY ONLY \$16.95 FOR BOTH \$5.95

All prices include excise tax. Postage and insurance MUST be prepaid, whether shipping weight is stated or not. Check with local post office if uncertain. Over payment is credited in full. Everything listed is brand new and fully guaranteed against defects. 25% deposit on C.O.D.'s. Items marked "Free", "Premium", or "Bonus" MUST be requested at time of purchase. Allow extra postage, handling for foreign orders.

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With the SCOPE, your projector can be used to preview films as soon as you get them. Show your films to small audiences of 5 or 6 people without darkening room or setting up a screen. With the built-in film notcher, you can edit right on your projector. Only \$14.95 at all camera stores.

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Write for free booklet #600- MP on how to edit movies.
Please include self-addressed, stamped envelope.

HOW FAR HAVE WE GONE?

Editor's Note: Herewith another in the series of lesser known but fascinating cameras of yesteryear, written up just as it would have been in "Modern Tests" when it was new.

**TWIN-LENS REFLEX FITS
INTO YOUR POCKET**



Manufacturer's specifications: Pilot folding twin-lens reflex, 1 1/4 x 1 1/8 in. (18 pictures on 127 film). **Lens:** 50mm f/3.5 Carl Zeiss Jena Tessar with stops to f/22, focusing to 3 ft. **Shutter:** Compur with speeds from 1 to 1/300 sec. plus B, T. **Viewing:** Waist-level ground glass with magnifier. **Other features:** Two-stroke rapid wind lever; automatic frame counter; eye-level optical finder. **Price:** \$85. **Manufacturer:** Kamera Werkstätten, Guthe & Thorsch, Dresden, Germany.

With the recent highly successful introduction of the tiny 35mm candid camera, the Leica, it's good that some thought has been given this year of 1931 to the non-35mm enthusiast by placing into his hands an almost equally small reflex camera complete with ground-glass focusing. The Pilot reflex when closed can easily fit an overcoat or sports jacket pocket or lady's handbag. Yet it is a full-fledged picture taker with first-class optics and a famous shutter.

(Continued on page 96)

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Dodged — cropped — Color corrected

16x20 ... \$6.50 11x14 ... \$4.50
8x10 \$1.50 5x7 \$65
3 1/2x5 ... \$15 2 1/2x1 1/2 .. \$10

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36—8x10's from uncut rolls
(3—12's or 5—8 exposure
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Professional Quality Prints
Price includes film processing

AGFA COLOR—KODACOLOR

"Plus" 250 A.S.A. meter "Experimental"
Color negative. Send \$5.00 for
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35mm Kodacolor our specialty

Roll film orders printed to size when film
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EXPOSURES	3 1/2"	3 1/2x5	5x7	8x10
8	\$8.00	\$1.20	\$4.00	\$10.00
12	1.25	1.80	6.00	15.00
20 (35mm)	1.60	3.00	9.00	

Minimum order \$3.50

Orders under \$10.00 must be prepaid.
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1961 MODEL EXAKTA VXiia

189⁵⁰



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AUTO- $\frac{1}{2}$ Zeiss Biotar
MATIC or f1.9 Iconar
Complete camera with PENTA
PRISM and RANGEFINDER.
CASE 9.95 1.25 post
10% DOWN-TRADES



TRUE, TRUE WIDE ANGLE
**30mm f2.8 RODENSTOCK
EURYGON**
for EXAKTA &
PRAKTIKA
75¢ post & handl
49⁵⁰
USED



250mm f4.5 FOLLO-FOCUS
for EXAKTA, HEILAND, PENTAX,
PENTACON, PRAKTIKA, & sim-
ilar single lens reflex.
The exciting new lens with the
amazing FOLLO-FOCUS lever that
keeps scenes in focus instantly.
German-made, PRE-SET DIAPHRAGM;
ALL STOPS.
BRAND NEW
400mm f8.5
FOLLO-FOCUS
NEW --- 75.95
59⁸⁵
10% DOWN-TRADES

Price includes
focusing lever.
Add 1.50 post & handl.

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PRICED SO LOW!

THE WORLD FAMOUS DUOPHOTO PHOTOCOPIER & PRINTER

THE UNIVERSAL COPY MACHINE THAT
CAN MAKE ANY NUMBER OF GLOSSY or
MATTE STAT PRINTS or the SHARPEST
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You'd expect to pay
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42⁰⁰

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Generous 10x15 print surface; automatic timer
turns machine off! Reproduces documents, film prints,
papers, checks, blue-prints, tracings, letters, pictures.
OPERATES in one light and reduces power waste cost.

LOW PRICE POSSIBLE---ONLY
... because of slight surface blemishes
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PERFECT OPERATION.

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(Continued from page 94)

If you press a convenient button on the side of the closed camera, the front plate containing the lenses and shutter springs outward and a generous two-piece focusing hood opens. The taking lens and shutter are attached to the camera body with a bellows while the viewing lens employs a telescoping metal tube. The entire front plate is held rigidly in place by crossed struts. You focus the camera by turning a large, easy-to-grip knob on the right side which causes the struts to change angle and thus move the front lens plate. The built-in magnifier showing an enlargement of the whole ground-glass area is set within a metal baffle which shields the ground glass from all extraneous light even in brilliant sunlight.

The camera body is well built and machined. Sliding a small button on the bottom allows the back to swing open, revealing one solid casting which not only includes polished film guide rails but the film chambers as well. Film can be loaded quickly. You close the back and advance the film until No. 1 on the paper backing appears in the rear ruby window. You can then set the automatic frame counter to 1 by pressing a small button. After each picture, two short, swift throws of the very handy folding wind lever automatically advance the film a full frame. Of course you must recock the shutter after each exposure and remember to advance the film.

We found the camera handles easily. The ground glass was sufficiently bright for accurate focusing. Although the viewing lens is not marked, it appears to be a matching 50mm f/3.5.

The picture size has much to commend itself. You can achieve the same number of exposures on a roll of 127 film as you can on a short 35mm cartridge (18 exposures) but the larger negative can produce sharper, less grainy pictures.

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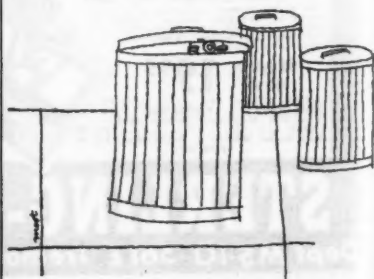
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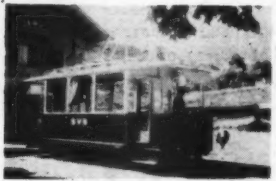
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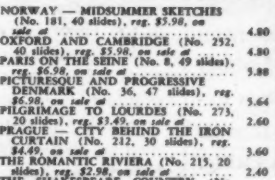
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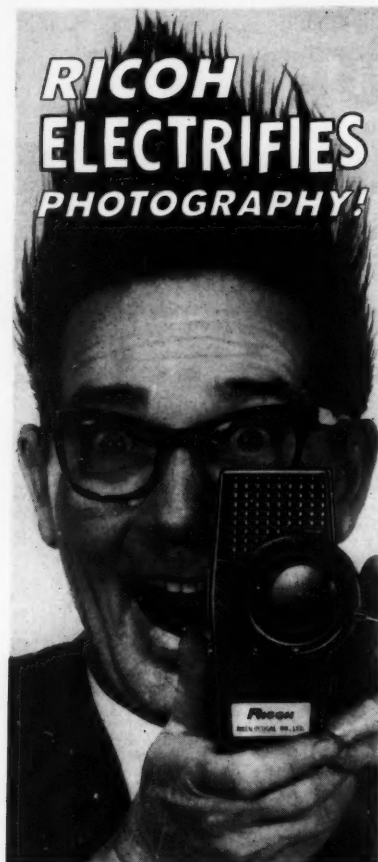
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MOVIE PROJECTORS

(Continued from page 82)

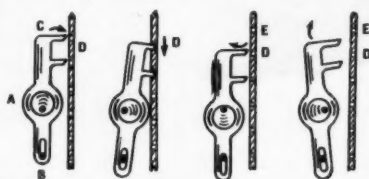
in devices for editing your footage.

Automatic threading is one of the latest innovations on 8mm projectors. It cuts down on film handling that often leads to scratches and smudges and it speeds up showings (Fig. 2, page 81).

Single-frame projection makes it easy to take a long, leisurely look at the high point in an action or expression. When you switch to single-frame a heat shield drops in place, protecting the film from the lamp—and also cutting down on the amount of light reaching the screen. We'd rate single-frame devices in general as nice to have—but the best of them rarely provide a very satisfactory image. Movie frames, because of the comparatively slow camera shutter speed and moving subject matter, rarely are as sharp as a still camera image.

But single-frame in conjunction with built-in editors certainly expands the versatility of an 8mm projector. A single-frame device makes it easier to select exact frames for cutting.

Most of the built-in editor-viewers provide an image that's quite satisfactory for editing. But the need to remove film from the sprocket drives and the gate for splicing makes editing on the



CYCLE OF CLAW (C) is controlled by eccentric axis A and pin B as it pulls frame D, rises to pull frame E.

projector a slower process than with separate rewinds and viewer. However, one advantage is that film is projected in the viewer at screening speed.

When you buy a projector, take along a roll of film that you yourself shot. It should be well exposed and sharp. And so much the better if you've already seen it satisfactorily projected on a friend's machine. Also take some clear footage and a reflected light meter.

Have your dealer project your film on a screen the same size as the one you'll use at home. Narrow your choice down to two or three machines and compare the projection on all of them. Sit about 8 or 9 ft. from the screen (for 30 x 40-in. image). Watch for sharpness of detail.

Next, test your prospective buys for light distribution by projecting the clear footage (exposed film would vary in density; with no film at all, the light spills out widely). Take readings at the center and sides. The difference should be no more than a stop.—THE END

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ELECTRONIC FLASH

(Continued from page 59)

about 1/250 sec., but the photographically useful part of the flash (strongest $\frac{2}{3}$) averages 1/1000 sec. This is much longer than the flash from the larger studio outfits. At portable unit exposure times (1/250 to 1/2000), there is no film-speed change of reciprocity effect great enough to be detectable even in carefully made pictures, for either black-and-white or color." *Anso*: Commonly used black-and-white films of this firm, Super Hypan and Versapan, require no exposure correction in the exposure range of 1/1600 to

1/100 sec. In color films, Super Anscochrome Daylight also requires no increase in exposure. Anscochrome Daylight requires an increase of $\frac{1}{3}$ stop in the same exposure range.

Ilford: Examination of sensitometric data especially prepared for this report by Ilford shows that for practical purposes most Ilford films show no reciprocity failure. However, Pan F film does show an appreciable loss of contrast. Since this film is in the very slow, high contrast group not normally used for electronic flash work, this exception will affect few photographers. If it is to be used for electronic flash, development should then be increased about 40%.

With all the claims of "lifetime use" being made for nickel-cadmium storage batteries, a brief analysis of these units seems in order. Nickel-cads have almost completely supplanted other types of storage batteries in amateur units. These are generally sealed in steel, require no maintenance, maintain their charge for long periods, and may be stored, charged or uncharged, for long periods without deterioration. In flash units, they are far superior to lead storage batteries which require much care. They have a few operational faults. Their output voltage is quite constant until almost discharged so it is difficult to build in any sort of meter control to check the state of charge. However, most portable units use rather small size cells (since nicads are expensive), and so the recycling times increase appreciably when the battery is in a low state of charge.

"Lifetime" batteries?

The life expectancy of the nicads is generally figured in number cycles of charge-recharge that can be extracted from the battery without excessive loss of energy. Figures for cycle expectancy vary from different sources. However, none will last forever, despite claims. For the sealed nicad, an expectancy of from 200 to 500 charges appears reasonable. This would indicate a life of from 4 to 10 years, depending on use.

One word of caution: Don't let a nicad-powered electronic flash unit run down completely. Polarity reversal may occur which may seriously impair the capacity of the cell, or even ruin it.

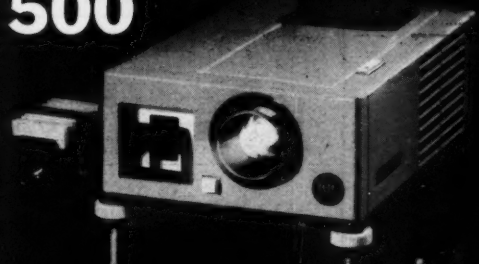
Recycle time for many flash units has been a serious and justifiable source of complaint by electronic flash users. Recycling time has commonly been designated as the time required for a unit's ready light to go on after the preceding flash. Ready lights, however, have been notoriously variable in indicating the actual storage energy. In some cases ready lights have been designed to light when the storage energy is half or less of peak. This is equivalent to a full stop of underexposure.

The proposed standard states "The recycle time is the time for the equipment after producing a flash to produce a second flash which is 70.7% as strong (equivalent to one half stop less exposure) as a flash produced with the energy storage capacitors at peak voltage as measured under conditions stipulated." If this specification of recycling time is adopted it will effectively eliminate the phony short recycling times now sometimes promulgated.

Many photographers have been sceptical about the efficiency of the new-look tiny electronic flash reflectors. Some entire electronic flash units are hardly any larger than conventional flashguns.

(Continued on page 102)

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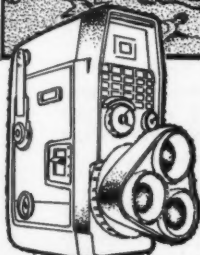
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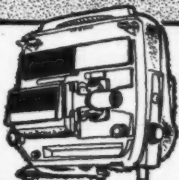
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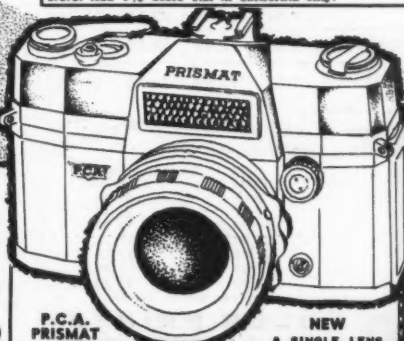
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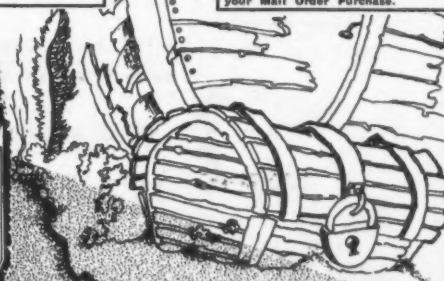
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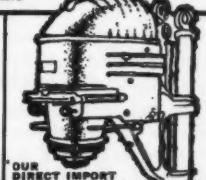
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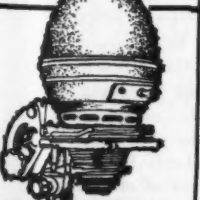
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ELECTRONIC FLASH

(Continued from page 100)

How effective are the small reflectors? In many units they do a very fine job. The secret of their success lies in the use of small flashtubes, with more efficient reflector systems. Larger, coiled tubes tended to absorb some of the light emitted by portions of the tube. By using a short flashtube of small diameter, more of the light emitted can be directed over the subject area. From an optical viewpoint, small tubes may be just as effective with a small reflector as a larger tube with a large reflector. We've seen a similar development in the designing of the jelly bean size AG-1 flashbulbs with their accompanying tiny reflectors.

Rectangular reflectors?

The rectangular reflector designs follow the proportions of the flashtube. These reflectors have two coverage angles. This design as we've seen is recognized in the proposed American Standard. It seems most efficient and logical for non-square negative format cameras such as the 35mm using a 1 x 1 1/2 frame.

Lastly, let's take up the sticky business of filtration. The color quality of light emitted by xenon flashtubes is close to that of daylight, but in effect is slightly bluer. Consequently most film manufacturers recommend a warming or UV filter to reduce the bluish effect.

In practice, however, because of the anti-reflection coating or the color of the optical glass in some lenses filtering may be unnecessary. In some flash units a filter is incorporated into the flash head by the manufacturer, eliminating the need for the filter at the camera. Additionally, some flashtubes develop a warming effect after some use. It's best first to try filterless daylight type color film with electronic flash and determine for yourself if you need a filter. There once was another reason why filtration was necessary with electronic flash units. Reciprocity failure produced by early electronic flash units having very short flash durations occurred to a different degree in the three layers making up the color film. The color balance was thus disturbed, necessitating a color filter to bring the three-layer emulsion back into balance. Modern amateur portable units, which have longer flash durations, fortunately do not have this problem.

You may think that the foregoing information is needlessly complicated. From the viewpoint of the photographer you are right. If standards had been adopted in the early days of electronic flash and had been adhered to, no explanations would now be needed save those between electronic flash designers

(Continued on page 106)

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MOVIE FILMS	
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8mm Mag. 50'	.75
16mm Mag. 50'	1.00
16mm x 100' Roll	2.50
8mm x 100' (Bolex)	3.95
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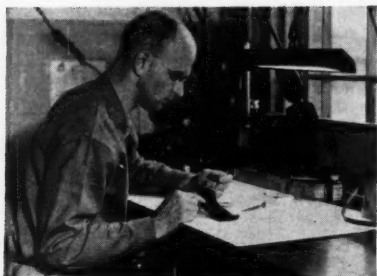
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ELECTRONIC FLASH

(Continued from page 102)

and technicians. All the problems facing the buyer or user of today's units would have been minimized or eliminated completely. It's not too late to make a fresh start toward that goal now.—THE END

Editor's Note: We would like to thank John V. Baccoli, Technical Service Manager of Ilford Inc., Harry L. Parker and Don Auerbach of Ascor (American Speedlight Corp.), S. W. Holmes of Eastman Kodak Co., Philip M. Mikoda of Ansco, J. A. Van den Broek of ASA (American Standards Association).

EFFECTIVE ZOOMS

(Continued from page 76)

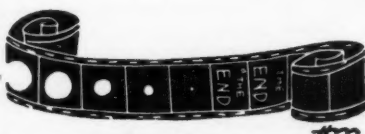
supports of the swings in the shot top left, page 77. As you zoom, those bars will appear to pass the camera lens—adding to the general feeling of movement. Too often, zoom shots look merely as if the frame is being narrowed, not as if the viewer is being drawn closer into the scene.

The same effect can be achieved by framing walls, trees or other stationary objects at the side of the frame when you start the zoom. Your scene takes on the effect of a dolly shot—the camera moving toward the subject.

The second feature of our straight zoom is that we gradually narrow the framing from six children down to one. Here we use the subject matter itself to emphasize rhythm and movement.

Panning plus zoom: The camera pans across the scene as the lens zooms, taking in more of the surroundings than would be possible with a straight zoom. In the scenes right, page 77, the surroundings are important for showing the viewer clearly what the workmen are doing. So, instead of framing them in the center of the shot and then zooming in, we place them slightly to the left in the wide-angle shot. We begin to zoom and pan slowly from the start of the shot. The main subjects should be at the center of the finder when the pan is nearly, but not quite, completed. Then, stop panning, and zoom slowly in to full telephoto position. Hold the shot for at least a few seconds.

Can you make a straight cut from a pan? Yes, you can. Remember to change the camera-to-subject angle and vary the framing somewhat.—M.A.M.



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EKTACHROME	135-36 Exp.	9.85	18.55	30.00
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ADD 5c per roll on film for postage and handling. ADD 10c for 16mm film for postage and handling.

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
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New Photo Books

MAKE YOUR OWN PHOTO EQUIPMENT,
by Geoffrey I. Lilley, 116 pages. The
Fountain Press, London. \$4.50

The "do-it-yourself" kick is here carried to its ultimate with the precision and artistry of fine cabinet making. Lilley first gives an entire home study course in carpentry including a dissertation on woods. Do you have ready access to a supply of Agba, Iroko, Afromosia, Afzelia, Abura?

After imbibing of the wood lore, learning to use bull-nosed router planes and discovering the differences between Whitworth, English and Continental threads (for your metalwork), you're ready to make a camera stand, a universal photographic bench, various pieces of lighting equipment, camera jigs and all sorts of darkroom equipment including, of course, the enlarger. (You can make the bellows for it, too.)

A home-made slide projector finishes off your tasks (non-automatic, alas). There's also a listing of supplies and suppliers limited to those on British sod. You might resort to importation, though. You would finally own equipment of a style and construction to outlast Gibraltar.—H.K.

PERSPECTIVE OF NUDES, by Bill Brandt, preface by Lawrence Durrell, introduction by Chapman Mortimer. 120 pages, 90 full-page illustrations. Amphoto, \$7.95*

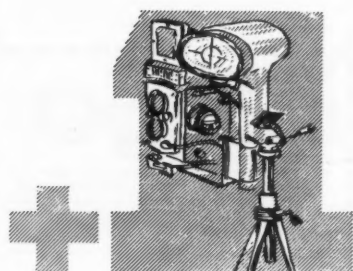
In 1945, when Bill Brandt began to photograph nudes, he discovered a large old wooden Kodak camera in a London used camera store. It had a wide-angle lens with a tiny fixed opening and no shutter. He decided that this was just the camera he needed for a fresh approach to nude photography. He had to experiment: the ground-glass image was extremely dim and even with high-speed film his exposure times ranged from 30 sec. to 3 min.

This book is the fruit of 15 years of experiment and achievement. It is divided into six sections, arranged in chronological order. In the first section Brandt places his models in empty rooms, somewhat away from camera, and uses the camera's depth of field and apparent perspective elongation to create impressions of nostalgic stillness amid the rush of time. Then he moves his camera closer to the models so that it is their bodies which are

(Continued on page 110)

(Continued on page 110)

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NEW PHOTO BOOKS

(Continued from page 108)

elongated instead of the space around them. In the third section he moves his camera closer still, isolating and creating strange relations between parts of their bodies.

Now, when the models are beginning to look abstract, some as if made of marble, others as if two-dimensional, Brandt takes his camera outdoors, onto a lonely, cliff-backed beach, again using the camera's extreme depth of field as he places his models—merely a foot, an elbow, a shoulder—right up against the lens. The pictures here are extraordinarily lyrical, as in the view of the beach in which the reclining model's ear fills the bottom of the frame. In the fifth and sixth sections, one indoors and the other outdoors, Brandt takes these close-ups even further, conjuring up strange, monolithic compositions out of folded arms, crossed legs, a hip.

I have described the sections in some detail because it is a rare and fascinating experience to follow the interreacting development of imagination and technique. Though many of these pictures remind one, at first glance, of sculpture, this impression is belied by audacious cropping and expressive backgrounds; and, in all but a very few pictures, it is dismissed entirely by the visible texture and softness of living flesh. Brandt has given us not an imitation of another art but a creation in a class by itself.—W.H.J.

CLOSE-UP PHOTOGRAPHY WITH YOUR CAMERA, by Harold Martin, 122 pages. Amphoto, \$2.50*

A solid technical book on close-up photography has been sorely needed. Unhappily, this is not it. While Martin is obviously familiar with and enthusiastic about using pre-World War II folding film pack cameras and large Graflexes for close-up work, his information on the materials and techniques for modern camera equipment goes little beyond what you would find in a catalog. He does include the necessary formulas and tables for the use of both close-up lenses and extension bellows, but it's obvious he has done little or no practical work with either. There are no hints on close-up work in actual practice. The book contains little information on special macro lenses, on reversing the lens for shooting closer than 1:1, or on lighting.

Illustrations consist of manufacturers' pictures of equipment, close-up shots furnished by the makers of equipment, and some ghastly close-ups bearing no credit markings—and no technical information either.—H.K.

HOW TO SHOOT AND SELL MONEY MAKING PICTURES, by Walter L. Harter, 121 pages, illustrated. Amphoto, \$2.50*

Walter L. Harter has obviously been quite successful in shooting and sell-
(Continued on page 114)

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Yet, the book has stirred a spectacular force in its critical admiration. Lawrence Durrell and Chapman Mortimer head a distinguished contingent of connoisseurs from diverse art fields who have acclaimed this work for its poignancy, its power and its meaning. Vogue Magazine carried pictures from the book in its August 1st issue. The New York Museum of Modern Art will exhibit Brandt's works from September 25 to November 12.

In these surreal studies of the nude, Bill Brandt expresses a philosophy of interpretative photography that soars far above the conventional camera-images we have grown to accept. His nudes inhabit a world of platonic forms. You feel the gnostic quality that resides in poetry and sculpture. You observe images and shapes, perspectives of the figure you never recognized before.

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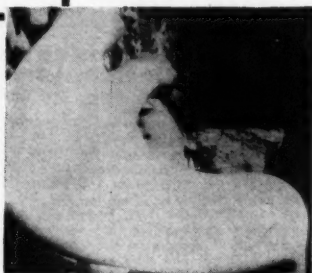
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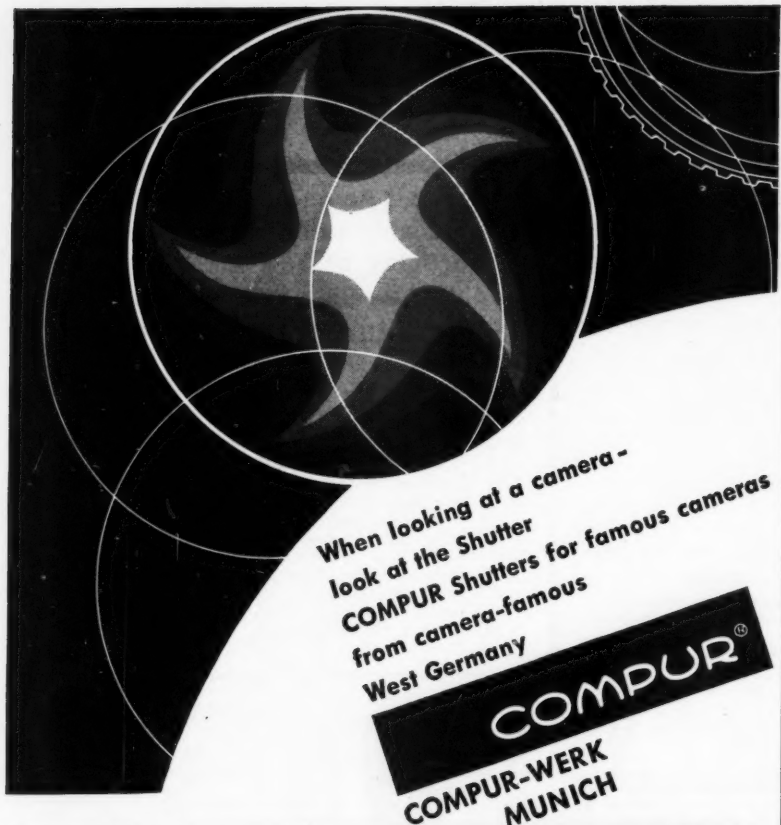
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NEW PHOTO BOOKS

(Continued from page 110)

ing photographs and stories to a variety of specialized and trade publications. The book consists mostly of suggestions for basic kinds of salable stories with specific examples gleaned from Harter's successes: the step-by-step how-to-do-it story (refinish a table and photograph the procedure), the picture sequence (a child's first steps), the travel picture (shoot an old covered wagon stop in the far west from three different angles, one for the Sunday paper in the largest town in the area, one for a travel magazine, and one for the religious press).

If you are interested in taking creative photographs for profit this book is not for you. If, however, you are willing to concentrate on the less glamorous but possibly more lucrative aspects of the profession, it should be of some help. Unfortunately, no market listing is included so before you can actually begin to submit photographs you will have to purchase another book (Harter very considerably suggests three) to find out where to send your material.—P.C.

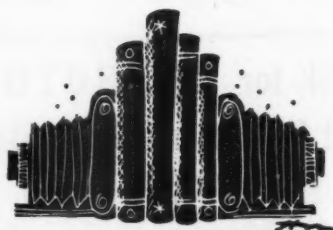
ODHAMS MANUAL OF PHOTOGRAPHY, 352 pages. The Macmillan Co., \$7.50

This impressive sized volume of British origin attempts to cover every aspect of photography, both still and motion picture. Unfortunately it is both aesthetically and technically antiquated and virtually useless—i.e. in describing cameras the author of that chapter lists only one automatic, which is no longer in existence—and neither is the company that made it. For developing negatives, the author recommends M.Q. developer and carefully tells you how to mix the ingredients. M.Q. developer as the preferred solution left the scene 20 years ago. In the actual picture taking chapters, you are told how to take static, sharp, pleasantly dull pictures of static, sharp, pleasantly dull subjects.

Typographical errors abound, indicating that proofreaders have had little experience with photographic nomenclature and lexicography.

No attempt has been made to give U.S. equivalents for the British and Continental materials. The entire listing of picture markets is almost useless, for the same reasons.—H.K.

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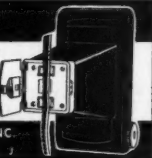
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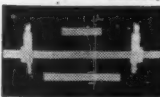
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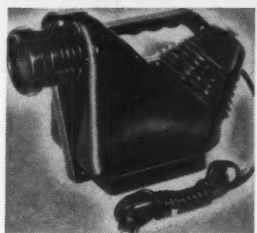
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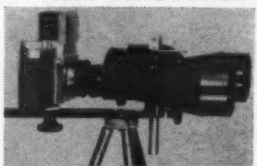
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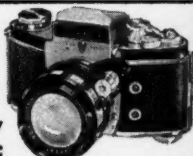
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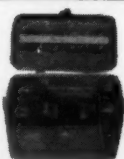
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